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The Marine Engineer

And Naval Architect.

LONDON, AUGUST, 1911.

THE INSTITUTION OF NAVAL ARCHITECTS

THE Jubilee Meetings of the Institution of Naval Architects, which had been postponed from last year owing to the death of King Edward VII. mark an important event in the history of the Institution. The fact that the Congress was opened by H.R.H. the Duke of Connaught, and was attended by a distinguished company, including many delegates of foreign Ministers, of Marine and Foreign Societies, is in itself a feature of great distinction. For a scientific profession and an Institution connected therewith of the national importance as that of the naval architect, everything was planned and carried out with that thoroughness and generosity which was worthy of the occasion. The papers read were for the most part of an historical character, and although much was of necessity ancient history the interest in the subject matter is largely maintained and increased by the fact that the authors of the papers were those who had been actually engaged in the making of that history. Dealing first with the Institution itself the paper setting out its internal history was contributed by Sir William White. The author sets out the condition of naval architecture in 1860, when the Institution was founded during a period of transition in regard to the design, construction and propulsion of ships, and when the steam re-construction of our navy was being effected after long hesitation and much opposition. The Institution started with a membership at the end of the first year of 324 and in 1911 it reached 2,047. The association of the Institution with outside bodies was alluded to and strong testimony was afforded of the value of the work done from a national standpoint, in appreciation of which the Admiralty have for years made an annual grant to the funds. Passing on we come to the paper contributed by Vice-Admiral Sir Henry Oram on "Fifty Years' Changes in British Warship Machinery." Coincident with the founding of the Institution was the period when the paddle-wheel was discarded and the screw propellor adopted in its stead for war vessels. Prior to 1860 the motion was transmitted through gearing, but in that year the direct-drive was adopted. Steam pressures had increased from 30 lbs. to 250 lbs. while the I.H.P. per ton of machinery had increased from 5·67 in the *Warrior* to 13·64 in the *Neptune*. The progressive development as set out in the paper affords very interesting reading, but probably one of the most instructive features is that of the changes of *personnel*. For example, in 1860 the Flagship of the Channel Squadron, the *Royal Albert*, of 500 N.H.P., had seven officers and twenty men in the engine-room, while in 1910 the *Neptune* of 25,000 S.H.P. had seven officers and 224 men. The history of the steam turbine from 1894 to 1910 was treated by Sir Charles A. Parsons, than whom there is no one who is more entitled to, or is more able to contribute the record.

May we now pass from our own particular history of naval architecture, which has had such a marked effect upon the present position of our great empire, and turn to that which must strike every one as the most significant matter dealt with at the Congress. We refer to the development of the shipbuilding industry in Japan. Three papers were read, *viz.:* "The Progress of Naval Construction in Japan" by Rear-Admiral Motoki Kondo, "The Progress of Naval Engineering in Japan" by Engineer-Rear-Admiral Terugoro Fujii, and the "Development of Merchant Shipbuilding in Japan" by Dr. S. Terano and Mr. M. Yukawa. It will be gathered from the first paper that although the Japanese had never constructed ships according to European methods till 1861, when the keel of the first warship was laid down, they have now four navy yards and three repairing yards. It was not till 1887 that an iron ship was built and not till 1906 that the first battleship *Satsuma* was launched, so that this remarkable development has taken place in about a generation. The Yokosuka navy yard was about 18 acres in extent in 1865 and employed 960 men, while to-day its acreage is 116 and 8,000 men are employed. This yard is equipped with all appliances necessary for the construction of the heaviest engines and boilers. The graving docks are four in number, the largest one being capable of taking ships of the largest dimensions and is equipped with a gantry fitted over the whole length, having several cranes ranging up to 30 tons. The Kure navy yard is the second oldest yard and was commenced in 1889, and since the Chinese war has been greatly developed. During the past sixteen years seven warships and fifteen destroyers and torpedo boats have been built, and to this yard is due the honour of having turned out the first armoured vessel built in Japan. The Sasebo navy yard was started in 1890 and has five large docks and one small one, while the Maidzura navy yard is the most recent, as it was only opened in 1901.

Admiral Fujii's paper shows that the total horse power of the Japanese Navy has increased from 70,000 in 1890 to 1,800,000 in 1911 and that 28% ofthe total I.H.P. of warship machinery comes from Great Britain. The history of the development of propelling machinery is given and concludes with the statement that both Curtis and Parsons turbines are being installed in new ships under construction. In dealing with the cost of machinery it is shown that the cost of manufacture in Japan is slightly less than in Europe and America, but that wages in Japan are constantly on the increase. The paper by Dr. Terano and Mr. Yukawa

shows the rapid growth of the Mercantile Marine due to the provisions of the Shipbuilding Encouragement Act, for in 1880 the total number and tonnage of registered steamers above 20 tons was 230 and 78,000 respectively, while in 1910 the figures are 1,700 and 1,200,000 respectively. All these records tend to show what a remarkable nation the Japanese are, for practically in the course of one generation the shipbuilding has passed from the construction of junks to that of battleships and fast ocean-going steamers. There could hardly be more eloquent testimony of the great capacity of this people for imitating others, and not only this, but the carrying out of such a policy on sound commercial lines. There is much food for the deepest thought as to what we can learn from those whom in the past we have done so much to educate, and it will be well if due consideration be given to many useful lessons that have been set forth as the result of practical experience and great administrative capacity of a race whose powers of development have startled the civilised world. The Congress will, we feel sure, not only do much for the cause of naval architecture in particular, but from a national standpoint tend to widen our views of perspective in general, which is what one would always desire in a great nation.

SIR PHILIP WATTS

THE position of Director of Naval Construction is not only a very responsible one, but is also one which is very exacting in its calls upon the physical organization of the holder. We were therefore not altogether surprised at the announcement recently made that the present director, Sir Philip Watts, would retire at the end of six months. Both Sir Philip and his predecessor, Sir William White, came back to the Admiralty from Messrs. Sir William Armstrong, Whitworth & Company, Ltd., of Elswick-on-the-Tyne, and we believe, in each case, at considerably lower remuneration than had been received at the latter place. It will be recognised generally, and by those who are capable of judging it will be demanded, that men of high scientific attainment must be retained by the State for the purpose of controlling the scientific side of naval construction, and to any commercial man there does not appear to be any reason why a properly qualified man should receive less in the Government service than in that of an outside employer. This question of remuneration has already been the subject of enquiry in the House of Commons, but it is hoped that when the matter is settled the remuneration will be on a scale which is compatible with the responsibilities of the position and the arduous character of the work involved. It will be interesting to many as to who will succeed Sir Philip, but whoever it is he will have a high standard to work up to, judging from that which has been set by him and his predecessors in office in the persons of Sir Edward Reed, Sir Nathaniel Barnaby and Sir William White, the latter two of whom are still with us, and take a deep interest in this branch of engineering, as was exemplified by their presence and activity at the Naval Architects' Congress last month. The period during which Sir Philip has occupied the position has been one of marked progression, not only in the matter of speed of ships, but in the offensive and defensive powers of their armament and the effect of the policy inaugurated during his tenure of office must have an effect which will last for years after he has retired. We feel that every one will cordially wish that the rest of retirement will enable Sir Philip to recuperate his energy, enjoy his well-earned relief from official responsibility, and be long spared to lend his assistance in the same manner as his predecessors have done before him.

TECHNICAL BOOKS.—The publisher of this journal will be pleased to forward, on receipt of cash with order, any technical book published.

SUBMARINE SIGNAL CO., THAMES ENTRANCE, BARROW CHANNEL.—An unmanned gas boat for experimental purposes has been moored by order of the Trinity House about two cables N.E. by N. from No. 1 Barrow lighted buoy. The gas boat is fitted with an automatic submarine bell actuated by the movement of the boat, therefore the number of strokes per minute will not be uniform.

"LONDON SHIPPING, WHO'S WHO," recently published, is an annual publication following on the lines of "Liverpool Shipping, Who's Who." The book consists of a directory, personal and official, to the shipping and allied trades in the Port of London, and is published at the office of the "Journal of Commerce" in London, and Charles Birchall, Ltd., Liverpool, at the modest price of 1s. It is a useful little publication and well worthy of perusal.

LLOYD'S REGISTER SHIPBUILDING RETURNS FOR QUARTER ENDED JUNE 30, 1911.—VESSELS UNDER CONSTRUCTION.—From the returns compiled by Lloyd's Register of Shipping it appears that, excluding warships, there were 496 vessels of 1,476,394 tons gross under construction in the United Kingdom at the close of the quarter ended June 30, 1911. The particulars of the vessels in question are as follows:—Steam: 459 steel vessels of 1,466,797 gross tonnage, wood and composite, seven vessels of 192 gross tons; sail, 17 vessels of 8,686 tons; 13 vessels, wood and composite, 719 gross tons. The tonnage now under construction is about 102,000 tons more than that which was in hand at the end of last quarter, and exceeds by 358,000 tons the tonnage building in June, 1910. The figures are the highest reported in the society's quarterly returns, being 62,000 tons more than the previous record total, which was reached in September, 1901. The figures for June, 1909, *viz.*, 745,000 tons, have been practically doubled in the last two years. Of the vessels under construction in the United Kingdom at the end of June, 371 of 1,000,528 tons are under the supervision of the surveyors of Lloyd's Register with a view to classification by this society. In addition, 64 vessels of 237,072 tons are building abroad to the society's classification. The total building at the present time under the supervision of Lloyd's Register is thus 435 vessels of 1,237,600 tons. With regard to foreign and colonial shipbuilding the amount of tonnage, excluding warships, under construction at various ports abroad, according to latest returns received, are placed against the respective countries. Vessels of less than 100 tons are not included. Gross tons—Austria-Hungary, 54,750; Belgium, 6,283; British Colonies, 1,470; China, 976; Denmark, 13,962; France, 126,180; Germany, 255,906; Greece, 170; Holland, 78,325; Italy, 19,991; Japan, 34,239; Norway, 16,948; Portugal, 1,100; Spain, 3,838; Sweden, 8,061; United States, 97,803.

REFRIGERATING APPARATUS FOR MARINE TRANSPORT.

(Continued from page 397, Vol. xxxiv.)

COOLING BY AIR CIRCULATION.

COOLING by brine circulation is an advance upon cooling by direct expansion, but both methods are subject to one somewhat serious drawback, viz., the presence of moisture remaining in the cold store, and in certain cases being frozen upon the expansion or brine pipes. All produce contains moisture, and it is one of the problems in connection with the efficient commercial transport of different forms of produce, that as little of the moisture as possible shall be extracted from it. Meat, for instance, weighs less on arrival at the port of destination than when it was delivered into the ship's hold, because a certain amount of moisture has been extracted from it. This applies more particularly to the case of chilled beef. On the other hand, the presence of moisture in a cold chamber, no matter what the substance may be that is held there, has a very deteriorating effect. Experience shows that it is cold, dry air which preserves all produce best, and that provided the air does not extract too much of the moisture of the produce, the initial cooling and the preservation of the low temperature required, is best obtained by the aid of a current of cold dry air circulating through the cold chamber.

A current of cold, dry air is obtained either by passing air that is to be circulated through the chamber, over a grid of expansion coils, over a grid of brine pipes, as shown in Fig. 11, or over a special apparatus described below in which liquid brine is kept in circulation, and the air to be cooled and dried is made to pass over or through it.

All brine, it should be mentioned, has the double property when at a low temperature of cooling air that is passed over it, and of abstracting moisture from the air. The salts mentioned, sodium chloride, calcium chloride and magnesium chloride are all what is known as liquescent. That is to say, they readily absorb moisture. Everyone is familiar with the trouble there is with salt on the mess tables particularly in certain muggy atmospheres. The salt absorbs moisture and forms itself into lumps, sometimes even becoming almost liquid. Calcium chloride, if placed in the path of air carrying moisture, such as that which has come from a cold chamber, will abstract the moisture from the air.

An important property of air should be mentioned here, *viz.*, its capacity for absorbing moisture. It varies with the temperature, rising very quickly as the temperature rises, and falling in the same ratio. Hence, if air at a certain temperature is passed over substances containing moisture, it will absorb a certain portion of the moisture from them, and if it is afterwards cooled to a lower temperature, it will part with a portion of the moisture it carries. Hence, the simplest method of cooling and drying air that is to be circulated through a cold chamber, is to pass it over a grid of either brine pipes or expansion coils. In the ships which carry fruit, such as bananas, this method is employed; a grid of expansion coils being fixed in a small chamber provided for the purpose, the refrigerant being carbonic acid, and the air being kept in circulation through the chamber, over the expansion coils, and thence to the cold store and back again. The moisture brought from the cold store condenses upon the surfaces of the expansion coils, and freezes there, the ice having to be knocked off periodically.

It is not wise to use direct expansion ammonia coils in the same way, for the reason stated above, *viz.*, the possibility of a leak of ammonia, and its being carried to the produce.

There are several forms of the other method of cooling and drying the air. In one method that used at the Victoria Docks in London, a number of corrugated iron plates are suspended vertically over a trough, in a chamber provided for the purpose. Cold brine is delivered to a perforated pipe or trough above the corrugated iron plates, and is allowed to trickle down over the surfaces of the plates into the trough below. The air to be cooled and dried is passed through the chamber, and between the corrugated iron plates, returned to and back to the cold stores. The cooling in this case is performed partly by direct contact of the air with the cold surfaces of the corrugated iron plates, and of the cold brine, and partly by evaporation of the water in the brine, on the other hand, the solution [illegible] trough containing brine [illegible]

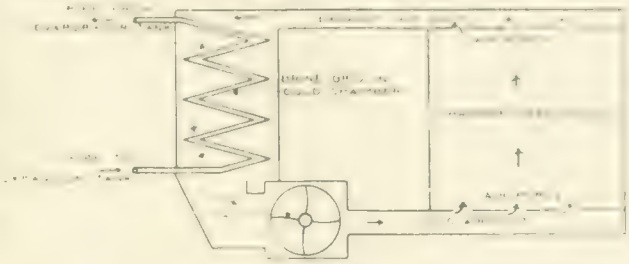


Fig. 11

brine. The process of cooling [illegible] the concentrated solution. The colder [illegible] quantity of brine out of the trough on its [illegible] the air that is passing over it. [illegible] absorbs a certain quantity of moisture from the [illegible] it on to the trough, [illegible]

HOW THE AIR IS CIRCULATED. [illegible] through the cold chambers by means of ducts [illegible] employed to drive the air through the [illegible] necessarily very much larger than pipes [illegible] the circulation of brine or [illegible] usually fixed outside of the [illegible] holds fitted for air cooling, the ducts are fitted [illegible] the holds and [illegible]

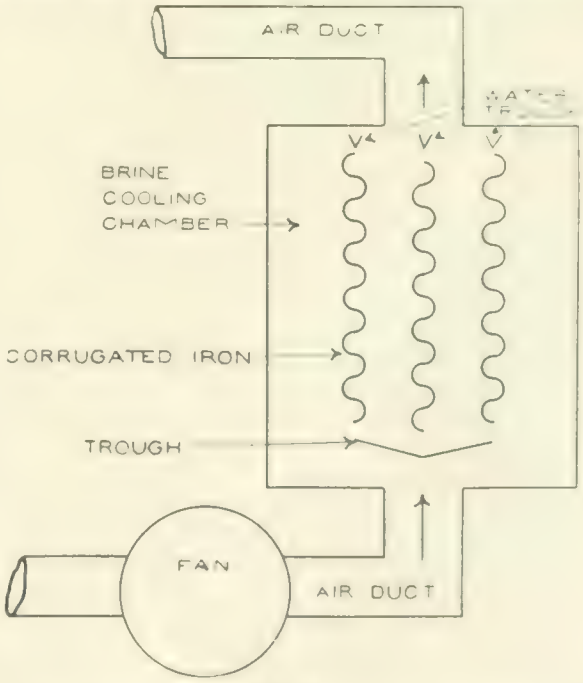


Fig. 12

[illegible]

ducts below. Where several chambers have to be supplied, providing that they contain the same kinds of produce, one duct is led to the neighbourhood of all the chambers from each side of the cooling apparatus, and branch ducts are led from the main duct to each chamber. Sliding ports control the passage of the air from the ducts into the chambers, both on the going and return side. In the case of the holds fitted for the carriage of quantities of fruit such as bananas, the ducts at the side are fitted with several pairs of sliding ports at intervals along the hold. These ports can be regulated at will, and it can be arranged by their aid that the circulation of the air through different parts of the hold is practically the same. It will be understood that the port nearest the air cooling apparatus will get the best supply of air, if it is open to the same extent as the ports farther away. It is an easy matter, however, by regulating the openings of the ports to provide for this. Fig. 13 shows the arrangement of brine pipes in the hold of a steam trawler.

Where there is more than one chamber and the produce in the two or more chambers is not the same, or where any one of the chambers carries any produce that emits an odour, such as onions, oranges, etc., or again where any one of the chambers carries produce that is particularly susceptible to odours, such as eggs, the going and return ducts for the supply of air to each chamber must be separate.

THE DIFFERENCES BETWEEN THE APPARATUS FOR THE DIFFERENT REFRIGERANTS.—As explained above, the arrangements of every compressor system of refrigeration are exactly the same, whatever the refrigerant may be; but there are certain differences between the apparatus employed. The

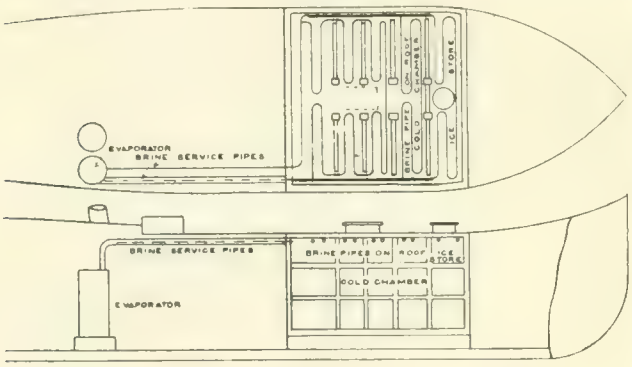


Fig 13.

pressures at which the different substances will liquefy vary very considerably, and the volume of the gas that has to be dealt with, and hence the sizes of the compressors also varies. Ammonia is most frequently used on shore, and is used to a considerably extent on board ship. Its pressure at 0°F., that is to say, the pressure at which, other things being the same, it would assume the temperature of 0°F., is 30 lbs. per square inch, and conversely when the pressure is reduced to that figure, the temperature is 0°F. Carbonic acid, on the other hand, has a very high pressure. At 0°F. its working pressure is 310 lbs. per square inch. Sulphurous acid has a pressure of 10 lbs. per square inch at 0°F.

At the same temperature, 0°F., 1 lb. of ammonia occupies a volume of 9·1 cubic ft., while carbonic acid only occupies a volume of 0·277 cubic ft., and sulphurous acid 7·35 cubic ft. This means that when the liquid ammonia, carbonic acid and sulphurous acid respectively are allowed to expand in the expansion coils, when the pressures mentioned above are reached, and when the temperature of 0°F. is reached, 1 lb. of the respective gases occupy the volumes mentioned. This leads again to the difference mentioned in the size of the compressors. The relative volumes of the compressors required to handle the refrigerant necessary to perform a certain cooling effect is as follows:—Ammonia 23·3, carbonic acid 3·24, and sulphurous acid 61·7.

Again, the different substances vary very considerably in their refrigerating effect. That is to say, a given weight of each of the three substances, when expanding from the liquid to the gaseous condition, abstracts a different quantity of heat from the surrounding substances. In expanding from the liquid condition to gas at 0°F., 1 lb. of ammonia will absorb 555·5 B.Th. units; 1 lb. of carbonic acid will absorb 123·2 heat units, and 1 lb. of sulphurous acid will absorb 171·2 heat units.

It would appear at first as if ammonia is very much more efficient than either carbonic acid or sulphurous acid, and particularly than carbonic acid, but this is not correct. According to measurements that have been made, ammonia is more efficient than carbonic acid, but the relative ratio of their efficiencies is not great. It will be remembered that the work that has to be done is mainly in the compressor, and that though carbonic acid gas has a small capacity for absorbing heat per lb., its relative capacity per cubic foot is not greatly different to that of ammonia, and it is the volume of the gas which counts when it has to be compressed. At minus 4°F. the relative volumes of 1 lb. of the three refrigerants are—ammonia 10·33 cubic ft., carbonic acid 0·312 cubic ft., and sulphurous acid 8·06 cubic ft.

Again, though the pressure to which carbonic acid has to be compressed is so very much higher than that to which ammonia and sulphurous acid have to be compressed, the quality of the gas to be dealt with is so much smaller, that the compressor itself is also very much smaller, and the matter fairly well equalizes itself.

It was mentioned above that the gases all have to be compressed to a certain figure in the compressor, before they are delivered to the condenser. These again vary with the substance. With ammonia, the pressure at which the gas is delivered to the condenser ranges from the neighbourhood of 100 lbs. per square inch upwards; with carbonic acid it is in the neighbourhood of 900 lbs. per square inch upwards, and sulphurous acid in the neighbourhood of 40 lbs. per square inch upwards.

As mentioned above, also, the pressure at which the gas has to be delivered to the condenser varies with the temperature of the cooling water. The higher the temperature of the cooling water, the higher has to be the pressure to which the gas is compressed before it enters the condenser. As marine engineers are aware, with steam, pressure and temperature increase and decrease together, in a certain ratio. With the gases named, ammonia, carbonic acid and sulphurous acid, the same thing rules. On refrigerating plant the gauge is arranged to show the pressure of the gas and its temperature. Gauges are usually placed over the condenser and in the neighbourhood of the suction pipe of the compressor. When water cools a gas, so that it condenses to the liquid state, it is evident that it can only reduce the temperature of the gas to a certain number of degrees above its own temperature. It is sometimes possible, with care, to extract the latent heat from a gas, so as to allow it to assume the liquid form, at a temperature only a few degrees, say, 5°F., above that of the cooling water. It is wiser, however, to allow for a difference of 10°F. between the temperature of the cooling water and that of the condensed gas. Hence a temperature of 10°F., say, above that of the cooling water is the lowest temperature to which the gas must be raised, and the corresponding pressure is that which must be produced in the compressor. With ammonia, for instance, with cooling water at a temperature of 55°F., the condenser gauge pressure will be 103 lbs. per square inch, or thereabouts. With cooling water at 60°, the condenser pressure rises to 115 lbs. per square inch, and so on. The increased pressure, it will be understood, demands an increased amount of work in the compressor, and therefore increased power.

The same remarks apply to the use of carbonic acid and sulphurous acid. In hot countries, the condenser pressure is increased, owing to the higher temperature of the cooling water, while in temperate and in colder countries, if refrigerating apparatus are employed, the condenser pressure is correspondingly lowered.

THE INTERNATIONAL MARINE MOTOR EXHIBITION.—An exhibition under the above name will be held at Copenhagen in 1912, from July to the end of August.

IMPERIAL MERCHANT SERVICE GUILD.—Considerable interest attaches to the appointment of Mr. Æneas L. A. Mackintosh as Junior Assistant Secretary of the Guild. Mr. Mackintosh did duty as navigator with the Antarctic expedition under the command of Sir Ernest Shackleton.

[illegible] million dollars have been set aside for [illegible] shares which bear the organisation down.

INSTITUTE OF MARINE ENGINEERS.

Visit to the Royal Botanic Society Gardens.

At the Royal Botanic Society Gardens on Friday, June [illegible] a reception and concert were held under the auspices of the Institute of Marine Engineers. The visitors spent the [illegible] part of the evening in looking through the large conservatories and gardens, after which a reception was held in the [illegible] conservatory by the President, the Most Hon. the Marquis of Graham, C.V.O., D.L., accompanied by the Marchioness of Graham, to whom a bouquet was presented by Miss Nellie [illegible] at a [illegible] reception, when members of Council and vice-presidents were introduced by Mr. J. [illegible], Chairman of Council. A concert was afterwards given in the large hall adjoining the conservatory, the artistes being Miss [illegible] Yanson, Miss Janie Blake, the Misses Crichlow, Mr. [illegible], Mr. D'Arcy Woollven and Mr. H. J. Silcock. A very pleasing ceremony followed when the High Commissioner for New Zealand, the Hon. Sir William Hall Jones, K.C.M.G., made the presentation of the Gold Emblem of New Zealand, given by the marine engineers of New Zealand to Mr. Frank Reddaway, J.P., of Manchester. A vote of thanks, which was proposed by the President and seconded by Mr. A. E. Battle (member of Council), was accorded to Sir William for attending at some personal inconvenience to make the presentation.

During the evening selections were given by the Salerno Orchestra under the direction of Mr. Clive Parsons.

THE NAVAL AIRSHIP.

In reply to a question asked in the House of Commons recently it was stated that the naval airship at Barrow would be ready for her trials at the end of July, but there seems every reason to believe that it will be some time in August before she again emerges from her shed. Various alterations are being made in the airship with the view of making her as efficient as possible when her trials, which are to be exhaustive, take place. Much interest is centred in the ship and in the possibilities of her success. Her designers are sanguine she will achieve all they claim for her. The problem has been solved that she can float safely, which means that she can land safely on water wherever her captain may wish to alight. It is probable that even army airships will have to be provided with reservoirs in which to alight so as to prevent accidents which have frequently happened when they have alighted on land. However, the Barrow airship is regarded much as an experiment, but her designers and builders are so sanguine of her success that they believe she will be the beginning of a fleet of airships to be used in connection with the navy. The Vickers' firm have had great experience in the building of this ship, which will be valuable in the future.

SALVING THE "IVERNIA."

The great feat of salving the *Ivernia* was brought to a successful conclusion by the Liverpool Salvage Association on Saturday, July 8th, when the vessel safely reached the Mersey from Queenstown Harbour.

The *Ivernia*, escorted by three tugs, made the journey under her own steam at nine knots, and was first berthed at the Canada Tongue, where she discharged sufficient cargo to enable her to enter the West Float, Birkenhead. While lying in the Corkbeg Shoal filled with water from end to end, no less than twenty-three portable pumps were used, of which sixteen were oil motors. A special smoke helmet, the invention of diver Fabeau, was used in discharging the cargo. The hull was buried in sand up to the turn of the bilges. Compressed air was used to dredge a channel, enabling the divers to patch the fracture. In the chief one under No. 2 hold were found pieces of wreckage embedded, supposed to be parts of the wreck of an American ship thirty or forty years old. A high wind once drove the ship off the shoal into deep water, when the draught became 54 feet, a disaster being averted by the scuppers having been previously plugged, the vessel being safely towed back on to the shoal. The whole operation has been a most difficult one, the success of which has been greatly due to the use of the motor pump, which forms an important part of the Association's equipment, these pumps having to often work under water.

Not only was the *Ivernia* a vessel amongst the greatest which have ever called for the ship-raising salvors' services, but she is believed to be the only big vessel which has ever presented a state of things where every compartment of the ship was thoroughly flooded, the engines and boilers being, however, fortunately undamaged. The vessel is appointed to recommence her sailings in September.

At the time of going to press the Board of Trade inquiry into the casualty has just completed, the finding of the court, delivered on the 22nd July, being to the following effect: That the serious damage sustained by the *Ivernia* was the consequence of the wrongful act of the Master in navigating the vessel at too high a speed in the increasingly thick weather. The Court, however, was satisfied that the course set by the Master from the Old Head of Kinsale was in itself a safe and proper course had it been made good. This was not done owing to some unknown error in the compass, for the non-discovery of which the Master or other officer appeared not to blame. Taking all the circumstances into consideration and the long service and great experience of the Master, the Court did not deal with his certificate, but severely censured and ordered him to pay £50 towards the cost of the inquiry.

Marine Society.—The quarterly Court of [illegible] ation of the Society's [illegible]

A NEW TYPE OF PUMP.

THE marine engineer is pre-eminently interested in the question of the efficient pumping of water. Both in the ordinary operations of steam raising, of salvage and in the handling of liquid cargoes the success of the performance very largely rests with the way the pumping is performed, and the cost at which it is done. During recent years the controversy as to the best type of pump to use has rested chiefly between the advocates of the reciprocating pump with its positive action, and the believers in the rotary drive of the centrifugal type. Both systems have much to recommend them, and it is therefore of interest to refer to a new type of pump which stands midway between the two, inasmuch as it combines the direct action of the plunger or piston with the rotary motion of the centrifugal. This pump, which, although only recently put upon the market is attracting a considerable amount of attention, is constructed upon a system devised by Mr. Vincent, of Cardiff, and already applied to a hydraulic transmission system to take the place of the clutch and gear box of a motor car, and is being placed upon the market by the Rotoplunge Pump Co., Ltd., of Albert Chambers, High Street, Cardiff.

The construction of the pump will be seen from Figs. 1 and 2, showing respectively the side and end cross-section of the arrangement. It will be noted that the outer casing of the pump is so shaped that adjacent to the inlet and outlet branches are two segmental ports of large area arranged round the circumference of a rotating drum. This drum is turned by means of the pump shaft, to which it is solidly keyed. In its mass, radially to the centre at angles of 60 degrees apart, are bored circular holes which form cylinders for a set of pistons shown. The width of the drum is sufficient to accommodate two sets of cylinders side by side, so that there are in each pump twelve cylinders and pistons rotating with the drum. At each end of the pump casing on the interior surface of the end covers are formed circular grooves or guides which, however, are eccentric with the main axis of rotation, the centre of the guide circle being vertically over the centre of the shaft and removed from it a distance of one half the depth of each cylinder in the drum. Projections on the rods of the pistons engage in these guides, and therefore, as the drum rotates, the pistons slide along the cylinders, each making a complete stroke and return for every revolution of the drum. It was stated above that the entering and leaving ports for the water extended nearly round the circumference of the drum. Their division extends over a segment slightly over the bore of one cylinder at the top and bottom of the casing. Owing to the eccentricity of the guide-paths, each piston, as the corresponding cylinder reaches a point vertically over the shaft, reaches the full extension of its outer stroke as shown in Fig. 1. As the rotation continues (counter-clock-wise in the drawing) the cylinder passes the dividing segment and reaches the inlet port; the piston then commences to move inwards, drawing water into the cylinder. This continues as the cylinder passes downward, the motion of the piston being gentle at the start, being at maximum velocity when the cylinder is horizontal, and diminishing to zero when the cylinder is vertically below the shaft. Hence all shock on the water or irregular reaction on the pump is avoided. As the cylinder reaches the bottom of the casing it passes behind the lower division segment and, full of water, with its piston at the inner extremity of the stroke, passes forward to the discharge port of the pump. Here the water is ejected from the cylinder by the piston, at first gently, then with increasing velocity till the cylinder is horizontal, and then with diminishing velocity as the circle is completed, the water therefore being discharged without shock. This in principle is the action of the pump which is most simple in construction.

It is hardly too much to say, perhaps, that this system of pumping may possibly create a revolution in pumping practice. We have a positive rotary plunger pump with no valves to get choked with dirt

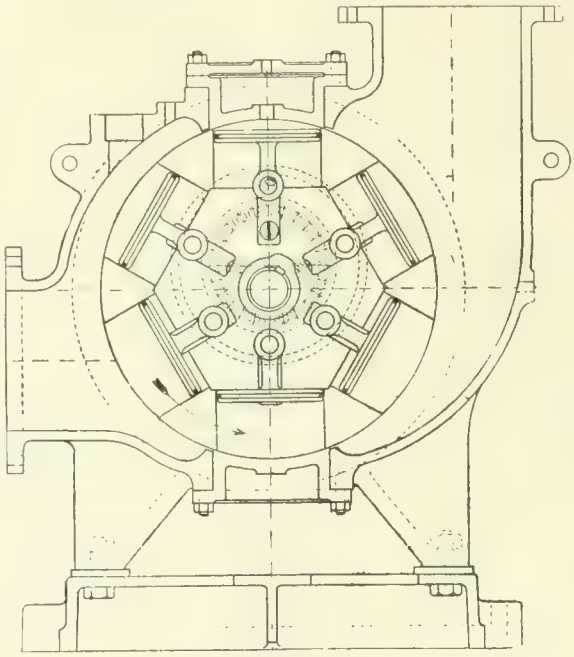


Fig. 1.

or chips, and which has been found capable of creating a vacuum to within half-an-inch of the barometer. It will consume the exhaust of the engine, thus making the engine more effective and silent, as well as avoiding the nuisance of exhaust steam flying about. There can be no water hammer and therefore no reaction. It requires but a small consumption of fuel, a 9-in. diameter pump worked by a single cylinder (without flywheel), 8 in. diameter, and 1 ft. stroke with steam at 60 lbs. pressure and when running at 200 revolutions per minute has been found to discharge 60,000 gallons, or about 270 tons per hour on an overall head of 40 ft. It can be regulated to suit any flow required. The pump works equally well at the slowest revolutions possible as it does at full speed, and will not lose its water which is a positive quantity at each revolution. It never requires priming, and it is very accessible as the whole of the plungers can be withdrawn and replaced in a very short time. The wear and tear are obviously practically nil. It will pump semi-solids and is specially adapted for ship's ballast or circulating pump

for marine and land work, for discharging oil in bulk, for salvage work, and in fact, for all classes of work where large quantities of water have to be removed in a short time. It occupies very little floor space; the floor space taken up by the above-mentioned pump, including the engine, is 2 ft. 6 ins. by 5 ft. 8 in., and is of comparatively small weight, and is easily handled. It is quite silent, and there is no perceptible vibration. No special foundations are required, which is a distinct asset on board ship, and it is stated that its positive action is so good that it can be used to measure a quantity of water.

It is a well-known fact among practical engineers that if a body of water has to be discharged in quick time, the best pumps to be employed are generally those of the centrifugal or rotary type, the ordinary reciprocating pump being cramped in its action and being very wasteful of steam (consequently of fuel) owing to so much

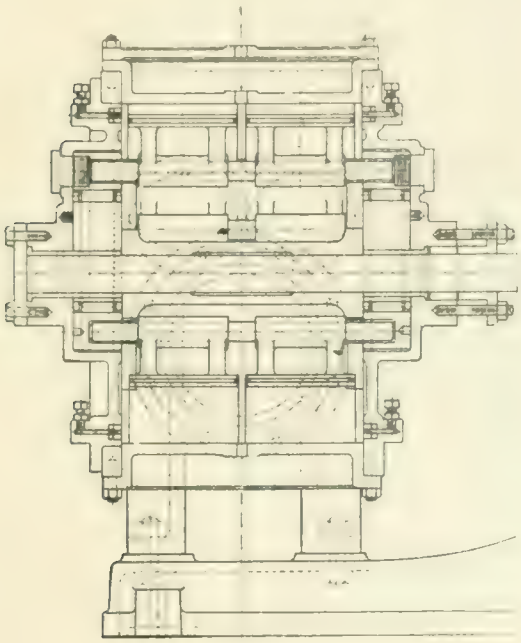


Fig. 2.

reaction taking placing. In the system under consideration the good qualities of both rotary and reciprocating pumps, and the bad qualities of neither are claimed. Fig. 3 shows the compact appearance of the pump. At the time the photograph was taken the pump was running at 200 r.p.m. on a rather temporary foundation and was discharging water at the rate of 1,000 gallons per minute through a [illegible] discharge pipe. The suction pipe through which the water was drawn from the river below was also 9-in. in diameter. Some very interesting tests were recently carried out by Mr. J. G. Walliker at Cardiff, before a number of prominent engineers, on a pump built by Messrs. Stothert & Pitt, Ltd., the well-known engineers of Bath, to determine its mechanical efficiency and its power of producing a vacuum.

Mr. Walliker records that on a vacuum test the pump showed 29·95 in. when the barometer was standing at 30·15 in. The results of Mr. Walliker's tests are given in the following tables:—

[illegible]

[illegible]	[illegible]	Revolutions [illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	50	[illegible]	[illegible]	Full open	[illegible]
[illegible]	[illegible]	128	[illegible]	[illegible]	7 56
[illegible]	30	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	20	[illegible]	[illegible]	[illegible]	[illegible]

Fig. 3.

PUMPING TESTS.

[illegible]

[illegible]	[illegible]	[illegible]	[illegible]	Number of [illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	per cent.	H.P.
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	28	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	30	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	20	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		tank [illegible] 250 [illegible]				

[illegible] inside diameter, [illegible]

from centre of suction to centre of discharge, 4 ft. 6 in. There were two right angle bends, and a foot valve was fitted at the bottom of the suction pipe 3 ft below water level allowing for friction the total over all head is equal to 33 ft

This pump discharged water full bore through dry pipes 33 ft head over all, including 25 ft 6 in suction, without priming in 8 seconds

An additional test, carried out to ascertain the fuel consumption, gave the following results for a one-hour run :—Steam pressure, 60 lb. per square inch ; revolutions, 200 per minute ; lift, 25 ft. 6 in ; head over all (allowing for friction), 33 ft. ; water delivered, about 270 tons ; coal consumption, 118 lb.

It should be noted that these tests were carried out on a pump which was newly manufactured. It is easy to understand that if it has been worked continuously for a few weeks and then retested, the efficiencies would reach a still higher percentage. As the figures stand, however, there is no doubt that a most remarkable development in the design of pumping plant has taken place, which merits the attention of all marine engineers.

INTERNATIONAL RUBBER EXHIBITION.

THIS Exhibition, which was held in the Agricultural Hall, Islington, from June 24th to July 14th, proved to be not only an improvement on its predecessors, International and more or less local, which we have seen, but an excellent display, and a very great success as an exhibition. The previous International Rubber Show was held about three years ago, and while it was of educational value and importance, the more recent one was a great advance, and represents an interval of exacting work on the part of the promoters and the organising manager, Mr. A. S. Manders, to whom congratulations are heartily accorded. Not only were visitors to the exhibition enabled to see the products from the various rubber producing countries of the world in the different stages from the latex or milk-like juice which flows from the tapped tree to the crude rubber as shipped to the manufacturing centres, but also highly interesting specimens of native workmanship, large photographs of the lands in different stages of development, from the wildness of uncultured nature to the well cared for plantations—the results of capital harnessing knowledge and experience, science and art, labour and power, to bring greater and more wide spread interest into the world of finance and commerce, and at the same time to meet an ever growing demand for an article which has become more and more important each year. The Knowledge and Experience of those who have been connected for many years with the rubber industry was well exemplified at the exhibition. The samples of manufactures shown by Messrs. Alden & Co., The Colonial Rubber Co., North British Rubber Co., The Continental Caoutchouc and Gutta Percha Co., The Guayule Rubber Co., The Dunlop Rubber Co., The Leyland and Birmingham Rubber Co., Irmo Rubber Works, Millwall Rubber Co., The Northern Rubber Co., The United Malaysian Rubber Co., The Re-inforced Rubber Co., and others. The machinery and tools shown by Messrs. Aylesbury and Garland, D. Bridge & Co., The Birmingham Iron Foundry, Bertrams, Limited, Brown & Davidson (Ceylon), J. & P. Hill, Hampson Bros. ; The Crude Washing Co. ; Warner, Ph. Pfleiderer and Perkins ; W. H. Cochrane & Co. ; Francis Shaw & Co., John Gordon & Co. ; Hewarth Erskine ; Macfarlane and Robinson ; Riley, Hargreaves & Co. ; Robert Warner and Co. ; Wallach Bros. ; and others. While the books on the rubber industry on sale or advertised by Messrs. J. H. Bussey, The India Rubber Publishing Co., and the journals specially devoted to the claims of rubber and allied industries, gave evidence of the desire to impart information derived from experience. The Science and Art which have been brought to bear upon the treatment of rubber in order to obtain the best results from it in the manufacture of the many articles and preparations for which it is suited were well illustrated at the stands of Messrs. A. H. Alden & Co. ; Alfred Smith ; The American Wax Co. ; Acme Chemical Co. ; The Canadian Mineral Rubber Co. ; The British Recovered Rubber Co. ; J. Barton Faithful and Company ; Elias Pure Rubber Process Co. ; and others. Labour and Power were also well represented, the former by natives present from some of the exhibiting countries and states, also by means of photographs showing the various operations carried on in the fields and plantations by coolies or aborigines, as according to the temperament and habits of those indigenous to the soil so is it necessary to employ or import labour. The power element for service at the growing, the distributing and manufacturing centres was illustrated at the stands of Messrs. Blackstone and Co. ; Crossley Bros. ; Davey, Paxman & Co. ; Hornsby and Sons ; Riley Hargreaves & Co. (suction gas engine and producer) ; and others.

During the exhibition the visitors were further enlightened and interested in the rubber industry by means of a cinematograph which showed the history of a plantation, beginning at the wilderness of growth which had to be cut down, burned and cleared, then the land hoed, levelled, seeds planted, the growing plants watered and tended, till in the course of time the trees become ripe for tapping. Next the gathering of the latex in buckets, its removal to the collecting stations, where the buckets are emptied into tanks mounted on wheels and taken to the factory where it is coagulated by a process similar to that of butter and cheese making. The prepared crude rubber is then rolled and dressed, weighed and packed ready for shipment. All these processes were shown as if in actual operation on the screen, and it was quite evident that the audiences fully appreciated the realistic display to which they were treated. The catalogue prepared and issued by the promoters was quite in keeping with the importance and excellence of the exhibition. It contains several interesting articles bearing on the rubber industry and its development, historical sketches of the producing territories with statistics to illustrate the rise and progress of these, and golden forecasts of the future possibilities. It would appear that the markets of the world can take as much rubber as can be produced ; the effect of over production would tend to lower prices, but with the numerous and increasing outlets for its use, a fall in price would probably tend to open up fresh outlets. The number of companies which were floated during the craze last year has no doubt included several which have an existence only in name, but many have started on good soil and will begin to produce in the course of another year or two. The Belgian exhibit was very interesting and artistic. On the walls were arranged weapons of war and of the chase, with specimens of the various kinds of masques worn on warlike demonstrations and expeditions ; photographs of the Congo territory, showing the aspect of the country before and after cultivation with the Aborigines in various attitudes to illustrate their habits and customs ; a series of photographs of sufferers under the influence of sleeping sickness illustrated the virulence of this disease. Imitation Edelweiss flowers were on sale for hospitals and research work in connection with the amelioration and cure from the attacks of this scourge. The sales of these flowers were inaugurated by the Queen of the Belgians. An oil painting of the King and another of the Queen were hung in the centre room of the Belgian exhibits. Space forbids further enlargement by commenting on the many specimens which were on view—to convince one that Africa contains enormous possibilities. America, France, Germany, Japan, the Netherlands were represented, and contributed to the fund of information *pro bono publico* Brazil, as became an old and well tried producer of rubber, was well in the front of the building with a pavilion, although somewhat bare of exhibits. African States, Malay States, the Straits Settlements, India and Ceylon each claimed attention, and had their claims allowed, as all had something of their own to show to interest the eye and mind. The exhibits from British Guiana, Gold Coast Colony, Jamaica, Madagascar, Trinidad, Tobago, Uganda and other regions all served to emphasise the fact of the international value and importance of the exhibition, and beyond this we are impressed with the enlarged and enlarging areas adapted for the cultivation of rubber, while on the other hand it is remarkable the innumerable outlets there are for the product in so many different directions.

The Institute of Naval Architects.

JUBILEE MEETINGS.

The Most Honourable The MARQUIS OF BRISTOL, Rear-Admiral, President.

THE International Congress in Naval Architecture and Marine Engineering with which the Institution of Naval Architects celebrated its Jubilee, opened on the 3rd July in the evening with a reception by the President, the Most Honourable the Marquis of Bristol, Rear-Admiral R.N., and the Marchioness, at the Royal United Service Institution. It will be remembered that the celebration of the jubilee of the founding of the Institution in 1860 had to be postponed last year owing to the lamented death of King Edward VII., who had been associated with the Institution for many years. Space does not permit us to give the names of the representatives of the many societies and institutions present at the meetings, suffice it to say, that delegates from all the foreign technical societies and the most important British institutions were there to assist in the general rejoicing on the attainment of its jubilee by this most important Institution.

A very busy week had been provided for, several events having been arranged, including visits to the Coronation Exhibition, Festival of Empire, a trip down the Thames in the *Royal Sovereign*, when the fitting out of the *Lusitania* was viewed, and on the evening of the 4th a reception was given by The Right Hon. Lord Brassey, G.C.B., past president of the Institution.

The Experimental Tank.

On the 5th of July the opening of the National Experimental Tank at Teddington by Lord Rayleigh drew a large number of members and friends. It will be remembered that the idea of a National Experimental Tank [illegible] its inception and realization to Mr. A. F. Yarrow. The tank has been designed by Dr. R. T. Glazebrook, the contracting for the building, carriage, and electrical equipment being done by Messrs. Dick Kerr & Co., Ltd., and the special equipment for making and shaping the models has been provided by Messrs. W. & T. Avery, Ltd. There are two tanks, the dimensions of the larger one being in length 549 feet over all, breadth 30 ft. on the water line, and depth of water 12 ft. 3 in. along the middle line. The length allows of a steady experimental run of from 100 to 200 feet, and at low speeds considerably more than this, something in the neighbourhood of 350 feet being possible at seven miles per hour. At the north end docks are provided for storage purposes, and a shelving beach at the south end to break up the waves generated by the model. The dimensions of the small tank are: Length, [illegible] ft., having a uniform section 31½ ft. in length, breadth [illegible] ft., depth, 3½ ft. The models used in the experiments are made of paraffin wax, provided by Messrs. Price & Co.,

and vary in length from 14 to 20 feet. They are shaped partly by a shaping machine, and partly by hand. The wax is melted in a large galvanized tank surrounded by hot water, and arrangements are made so that the wax may be brought to and maintained at any temperature desired. The model when completed is towed from a carriage at the end of a dynamometer arm, along the surface of the covered waterway. The carriage is electrically driven, and travels at any speed from 1 foot to 25 feet per second, and runs on two sets of rails laid on top of the tank walls.

A crowded week was wound up in a most pleasant manner. A visit to Windsor Castle on the 8th July was undertaken by command of His Majesty the King, and several hundred guests went down by special train from Paddington. The state apartments were inspected, and after about three hours' stay the party returned by the same route.

Referring to the earlier part of the Congress, the proceedings were officially opened by H.R.H. the Duke of Connaught on the 4th July, in the Grand Hall of the Connaught Rooms in Gt. Queen Street, Kingsway.

Address by H.R.H. the Duke of Connaught.

The Duke in addressing the members said it was his pleasing duty, as honorary president, to welcome all those who had come to attend the Jubilee meeting of the Institution. He appreciated the enormous advance that had taken place in naval architecture since they last met in International Congress in the Diamond Jubilee of Her late Majesty Queen Victoria. We had merely to look at the great ships now sailing on the waters to see the enormous advance made during the last fourteen years, such advances not being made without consummate skill, consummate knowledge, and great application. Those who had the pleasure of attending the Naval Review at Spithead, could not help comparing the ships at that review with those of only nine years ago, and it must be recognised that the advance was something colossal. We did not know where finality in size was going to end, but we must certainly recognise the wonderful combination of skill, knowledge and mathematical knowledge that produced the wonderful ships of the present day.

After Rear-Admiral C. J. Briggs, Controller of the Navy, on behalf of the First Lord of the Admiralty, had extended a welcome to the foreign members, the President of the Institution, the Marquis of Bristol, delivered the presidential address.

Presidential Address.

The Marquis touched upon the honour done him by the Council and members in selecting him as their president, and said that the occasion of their meeting was a commemorative one, for the founding of their society fifty-one years ago marked an epoch in the history of naval architecture which synchronised with the first construction of sea-going iron ships, with the introduction of protecting armour, and with the advance to a position of great importance of the naval engineering element. He did not propose to pursue the contemplation of these subjects, as they would be dealt with in the papers to be read before the Institution. After stating that a much earlier society for the improvement of naval architecture was founded shortly before the close of the eighteenth century, but whose existence was a brief one, his Lordship continued: We live in a period of incessant change and movement. One had only to glance back to the time of the last International Congress, held in London in 1897, to see what remarkable developments had taken place in that brief period. Mr. Goschen, the then First Lord of the Admiralty, in his speech of welcome to the Congress, expressed the hope that the outcome of that meeting would not result in discoveries which would make obsolete our fleet as it then existed. Since then fourteen years have elapsed, and what has happened? Displacement and speed have gone up by leaps and bounds, gun-power for attack and armour for defence have increased in efficiency with almost equal rapidity. Concentration of power has led to the creation of warships undreamt of in 1897. Improvements in propelling and auxiliary engines, and the introduction of new forms of fuel and combustion, have brought about equally startling results in speed, power of endurance, and methods of propulsion. Submarines, the dream of that fascinating writer, Jules Verne, are an accomplished fact; and if their range of action for attack was not yet equal to that of Captain Nemo's famous *Nautilus*, they were undoubtedly a great potential factor in our organisation for defence.

In the sister art of merchant-ship construction the advances made in recent years have been almost equally great, and the Transactions of the Institution contained remarkable evidence of the progressive spirit that had animated the designers and constructors of ships and their machinery during this period. Well deserved is the recognition that has now been freely accorded to this Society. Its growing membership and financial prosperity are valuable assets, but more valuable even than these is the constant and sympathetic interest of the great administrative departments of the State. The presence of their distinguished representatives that day was a strong and welcome proof of this friendly attitude. But, above all, they valued the gracious action of their Sovereign in extending his patronage to the Institution. By the granting of a Charter of Incorporation, His Majesty had undoubtedly established it upon a new and permanent foundation.

The International Congress in Naval Architecture and Marine Engineering, which forms the principal feature of the Jubilee Meetings, was intended primarily to bring together from all parts of the world the great leaders in the sphere of industrial activity. These were the men whose brains had conceived the mighty structures, the floating fortresses and palaces that composed our fleets of war and commerce. To their energy and skill, to their infinite capacity for taking pains, to their splendid victories of mind over matter, was owing whatever they possessed of value to those "that go down to the sea in ships and do business in great waters." That they should be honoured on this occasion by the presence of such distinguished representatives of other nations is a compliment of which they deeply appreciated the value and significance. The Council desired to signalise the present occasion and to do honour to their guests from abroad by adding to the roll of honorary members the names of H.M. the King of Norway, H.M. the King of Spain, H.M. the King of Sweden, H.I.H. Prince Henry of Prussia, H.I.H. Archduke Ferdinand, H.R.H. the Duke of Connaught, H.R.H. the Duke of Genoa, Prince Roland Bonaparte, Lord Rayleigh, Admiral Dewey, Admiral Togo, and Admiral Ijuin. Concluding, he would ask H.R.H. the Duke of Connaught to accept their hearty thanks for his great kindness in coming at considerable inconvenience to preside over their inaugural meeting and to allow him in the name of all those assembled to send a message of loyalty and homage to His Majesty the King, Patron of the Institution of Naval Architects.

The Papers.

The papers down for reading during the Congress numbered twenty-one, and included contributions from the representatives of the following foreign countries, France, Germany, Italy, Japan, Sweden, U.S.A., but it was found necessary in order to cope with such a number that several had to be taken as read. Below we proceed to give abstracts from some of the papers and others we have dealt with editorially in this number.

The Rational Application of Turbines to Ship Propulsion.

In this paper, by Mon. A. C. E. Rateau, the different points of efficiency of the turbine and the reciprocating engine were briefly referred to. He left out of consideration the proposals to employ toothed gearing or electric motors, and confined himself to what had been accomplished with the steam engines themselves. The necessity of effecting a combination of the two kinds of engines had been foreseen since 1900. In 1906 the French destroyer *Voltigeur*, which had attained a speed of 31.4 knots, against 28 knots required by the contract, was fitted with a reciprocating engine on the centre shaft and turbines on the wing shafts. She had undeniably demonstrated the superiority of the system, because below 20 knots the consumption was slightly above that obtained in destroyers of the same class fitted with reciprocating engines, while

above 20 knots, notwithstanding the presence of the reciprocating engines, which under such conditions were not advantageous, the consumption was less than with other destroyers fitted with turbines only. This was due to the superior efficiency obtained with multicellular turbines. In M. Rateau's opinion the best arrangement was that by which the propulsive power was distributed on four shafts, each pair (port and starboard) being worked by an absolutely independent set of engines. In each set a reciprocating engine drove the wing shaft, and exhausted into a turbine which drove the inner shaft. The reciprocating engines and the turbines were designed to develop a power equally distributed on the four shafts when running at [illegible] feet. At cruising speeds the reciprocating engines developed much more power than the turbines. Such an arrangement afforded several advantages. For the same weight of machinery, relatively to the propelling engines, there would be an increase of the maximum power from 15 per cent. to 20 per cent., which corresponded to an increase of speed from 5 per cent. to 7 per cent. of the maximum speed, say, 1 to 1.5 knots for battleships intended for 20 knots. At cruising speed the consumption would probably be less than that of ships with reciprocating engines only, and it would not reach one half of that with turbines, while by comparison with the latter the radius of action would be doubled, or, if preferred, the fuel supply might be reduced. If it were intended to adopt the combined system for small vessels such as scouts and destroyers, it would be necessary to employ an arrangement similar to that of the *Lorgnon*. The almost universal opinion, however, was that it was wise to abandon the use of reciprocating engines for scouts and destroyers, and the conditions rendered turbines and liquid fuel essential. The difficulty was to obtain a good efficiency at ordinary cruising speeds. In an arrangement proposed by the author the high-pressure turbine maintained constantly a relatively high velocity of rotation at low vessel speeds, and, in consequence, a higher efficiency. The ship was propelled by three screws, each shaft being driven by a turbine. Only the two wing turbines were arranged for going astern. The centre turbine was fitted with a steam inlet at the forward end and with a by-pass slightly aft. The exhaust of this turbine was connected with pipes to forward inlets of the wing turbines, and also by pipes to inlets further aft. The wing turbines also had inlets for live steam. All these pipes were fitted with valves. When cruising at 15 knots the centre turbine received live steam and exhausted into the forward end of the wing turbines which then received no other steam. If the speed had to be increased the by-pass was opened. For higher speeds live steam would be admitted into one or both of the wing turbines. By this arrangement the centre turbine always worked at great speed, but the power developed on the three shafts would not be equally distributed as at low speeds the centre shaft developed relatively more power than at high speeds. At low speeds, nearly all the power being on the centre shaft, the slip of its propeller was great, say, from 25 per cent. to 30 per cent., while the slip of the wing propellers was small. These conditions would exist so long as the live steam was admitted to the centre turbine only. When live steam was admitted into the wing turbines the work produced by the centre turbine increased very little, the increase of power being almost entirely due to the wing propellers. Their slip increased while that of the centre screw decreased, and the speed of rotation of the latter rose far less quickly than that of the wing screws. Thus the best results had been obtained, whereby at ordinary cruising speed a centre turbine did duty as a cruising turbine having a very high speed of rotation. This paper concluded with a reference to the design of propellers.

The Marine Steam Turbine from 1894 to 1910.

This paper by the Hon. Sir Charles Parsons traced the history of the marine steam turbine from 1894 to 1910. He said that the application of the steam turbine to the propulsion of vessels was entertained as early as 1884, but its development was not seriously considered till 1892, when the economy of the condensing turbine as applied to driving dynamos had excelled that of the compound reciprocating engine for the same purpose. The first order was in 1894 for a destroyer, the [illegible] from the British Admiralty, and at about the same time Messrs. Sir W. G. Armstrong, Whitworth & Co., placed an order for the machinery of another similar destroyer, the [illegible]. It was very early realised that the suitability of the turbine for steam of very low pressure would find an important application in ships by working the turbine from the exhaust of reciprocating engines, but not until 1901 was the first combination vessel, the *Velox*, a gunboat destroyer, laid down as a speculation by the Parsons Marine Steam Turbine Company. Her main propelling machinery was nearly a duplicate of the *Viper's*, but in order to increase the economy at speeds below 13 knots, two triple expansion engines of 150 h.p. each were coupled to the L.P. turbine shafts through flexible and detachable clutch couplings. In 1902 the Admiralty placed the order for the third cruiser *Amethyst* with turbines, and for three sister vessels with reciprocating engines of 10,000 h.p. The comparative trials of these vessels had a great influence upon the future of the turbine. The first turbine battleship, the *Dreadnought*, was laid down at Portsmouth in October, 1905. At full power her steam consumption was 13.38 lb. per s.h.p. per hour, while in the succeeding battleships of the class it averaged 13.01 lb., and in the three cruisers of the *Invincible* class 12.03 lb. With reciprocating engines nearly 16 lb. would be a fair average, and it thus followed that a great reduction in boiler weights was permissible. Again the high efficiency of the low pressure turbine made it well worth while to pass the exhaust steam from the auxiliary engines to this turbine instead of to the condenser. Indeed, the exhaust steam in some battleships had been proved to be alone sufficient to drive the vessel at a speed of five to six knots. The coal consumption at full power of the three 26-knot armoured cruisers of the *Invincible* class ranged from 1.2 lb. to 1.7 lb. per s.h.p. per hour, the average for the three ships being 1.47 lb. per s.h.p. In the three cruisers of the *Minotaur* class with piston engines, it was 1.8 lb., and in the six cruisers of the *Duke of Edinburgh* or *Warrior* class 2.1 lb. per i.h.p. per hour. On the 30 hours' endurance trial at 70 per cent. of the total power, the turbines also proved more efficient, although the advantage was not so marked. In the mercantile marine, the first vessel to be fitted with turbines was the Clyde passenger steamer, *King Edward* and her success led to the construction of a second vessel for the Clyde passenger traffic in 1903, and in the same year the *Queen* was built for the Dover and Calais route. All these vessels had three shafts, the high-pressure turbine in the centre exhausting into two low-pressure turbines on the wing shafts. The first vessels to be fitted with turbines for Transatlantic service were ordered by the Allan Line, *viz.*, the *Victorian* and *Virginian*, and the adoption of turbines in preference to reciprocating engines for the *Mauretania* and *Lusitania* of 70,000 h.p. completed the entry of the turbine into all classes of fast vessels for which it was at the time deemed suitable. Turbines of the Parsons type were now being built in the engineering works of France, Germany, Austria, Italy, Russia, Spain, Belgium, Sweden, and Denmark, as well as in Japan and the United States of America. At the end of last year the Parsons steam turbines which had been, or were being, applied to marine propulsion had an aggregate h.p. exceeding 5,000,000. Since the construction of the turbine of the *Turbinia* in 1897, which were in series on the [illegible] and on three shafts, there had been no very notable increase in economy in steam per s.h.p. The chief governing factors were weight and cost dependent on a limited [illegible] speed of turbine, which was governed by the maximum speed of revolution allowed by the propeller, and from the beginning a point of compromise had been arrived at between turbine and propeller. Such limitations would, however, be materially reduced should geared turbines come into use, and higher coefficients of turbine efficiency would then become possible and compatible with moderate first cost and weight, the question of propeller efficiency would be more easily dealt with, and the gain in total propulsive efficiency thereby would be substantial. The author proceeded to refer to the combination [illegible] and to the use of reduction gearing between the turbine and the propeller, and finally gave some details about the turbine vessels at present building or recently built in various parts of the world.

(To be continued.)

NAVAL MATTERS—PAST AND PROSPECTIVE.

(*From our Own Correspondent*).

Portsmouth Dockyard.

IT has been announced that our new battleship the *Orion* is to be commissioned in November to relieve the *Hibernia* in the Second Division of the Home Fleet. The battleship *King George V.* is making steady progress and will be launched about a month before the *Orion* hoists the pennant. The cruiser *Drake,* now being refitted, has been ordered to relieve the *Powerful* as flagship on the Australian station. Owing to the amount of work involved in the refit, it is not expected that the *Drake* will take up her duties before January. On being relieved the *Powerful* will return home and take up duty at Devonport. The destroyers *Bonetta* and *Osprey*, of the Fourth Flotilla, were in collision at Berehaven on July 5th, while leaving the harbour, the *Bonetta* having her bows badly twisted above the water line. Temporary repairs were effected and the vessel came here escorted by the *Osprey,* which was uninjured. A sad mishap occurred on board the battleship *Superb,* which was re-commissioned at this port for the First Division of the Home Fleet at the end of May, three of her crew having been suffocated by poisonous gas that had accumulated in the ship's hold. The gas is said to have been generated by decayed potatoes. The battleship *Hercules* is to be commissioned on August 1st as flagship of the Vice-Admiral commanding the Second Division of the Home Fleet, relieving the *King Edward VII.,* which is to be the flagship of the Vice-Admiral commanding the Third and Fourth Divisions. The battleship *New Zealand,* now in the Second Division, is to join the local sub-division of the Home Fleet. Her name is to be changed on recommissioning on August 1st, when she will become the flagship of Rear-Admiral Limpus in place of the *Prince George,* which joins the Devonport sub-division. A berth is being dredged for the new floating coal depot, which is to have a capacity of 20,000 tons, and will be placed further up the harbour than the present depot, the capacity of which is 12,000 tons. The museum in the yard, which has been in course of formation for some years, has now been formally opened, the ceremony being performed by Mrs. Tate, wife of the Admiral-Superintendent, in the presence of the principal officers of the yard and their wives. Engineer Rear Admiral J. J. Frost, who has just been promoted to that rank, entered the service in 1876, and became engineer captain in August, 1907. Since August last he has been on the staff of the local division of the Home Fleet under Rear-Admirals Brock and Limpus.

Devonport Dockyard.

The construction of the battleship *Centurion* is proceeding apace, and doubtless in a few weeks a date will be named for her launch. As to the cruiser *Lion,* the second stage in the arming of that vessel was commenced on July 17th by the lifting on board of the first of the sixteen 4-inch quick-firing gun mountings. The main armament equipment is practically complete. The *Lion* will shortly be placed in dock at the North Yard to prepare for her steam, gunnery and other trials. She is expected to be ready for commissioning by Christmas. There are quite a large number of ships in dockyard hands, including the cruisers *Europa, Defence,* and *Blake,* and the mine-layer *Apollo.* The *Europa* is to undergo a thorough overhaul, £72,000 being the sum allowed for the repair of the vessel. Several destroyers are in hand, including the *Arun,* whose refit is mainly concerned with the engine room department and the re-tubing of the boilers. The destroyer *Sunfish,* of the Sixth Flotilla, arrived on July 6th for repair in company with the *Bruizer.* The former vessel was clearing her moorings in Waterford Harbour the previous morning when she was carried on to the bows of the destroyer *Havock.* While the *Sunfish* was trying to get clear of the *Havock* her stern collided with Torpedo Boat No. 045, striking the latter vessel on the starboard quarter. The *Sunfish* was only slightly damaged. The *Bittern,* of the Fifth Destroyer Flotilla, has arrived with a main shaft broken. She was at tactical exercises in Bantry Bay, on the west coast of Ireland, when the damage was discovered. The vessel was escorted here by a flotilla of destroyers which was proceeding up Channel. The *Bittern,* although only able to use one engine, averaged ten knots during the run from Ireland. The gunboat *Kingdove's* refit has been completed and she left on July 17th to resume fishery protection duties on the coast of Scotland. The Greek cruiser *Georgios Averoff* has been docked in consequence of having sustained damage to her hull by touching a rock when entering Plymouth Sound on July 1st without a pilot. Nearly 60 feet of her plating was torn out or fractured, and the damage will take until the middle of August to repair, while the cost will be about £4,000. The *Lynx,* of the Fifth Destroyer Flotilla, has been paid off until she can be taken in hand for re-tubing. Such defects are to be completed as will enable the vessel to proceed under her own steam to Pembroke Dock or Haulbowline. The destroyer *Teviot* has proceeded to Gibraltar, where she will be taken in hand for re-tubing. On arrival there she was paid off, her crew being transferred to the *Kestrel,* which returns to England. Six submarines of the B class—Nos. 6, 7, 8, 9, 10 and 11—are to leave here under escort of the scout *Pathfinder* and the cruiser *Bonaventure* for the Mediterranean on August 14th. The first three of the submarines are to be stationed at Gibraltar, and the last three at Malta. Among the ships sold at the sale on July 11th, was the battleship *Camperdown,* which went for £28,000; the battleship *Repulse,* which was sold for £33,500; and the destroyers *Contest, Shark* and *Hardy,* which were sold for £1,760, £1,575, and £1,400 respectively. The *Lynx, Daring* and *Spitfire,* lately serving in the Sixth Destroyer Flotilla, are to be placed on the sale list. They were built seventeen or eighteen years ago, and were all originally capable of steaming at twenty-seven knots.

Chatham Dockyard.

Work in the yard has been rather quiet of late, Chatham having been practically deserted since the vessels were sent to take part in the Coronation review and the Fleet exercises. Our new cruiser the *Chatham* is progressing fairly well and will shortly be launched. The *Thames,* depot ship for submarines, has been taken in hand for refit, and the destroyer *Derwent* has been docked for repairs to her machinery. The destroyer *Cherwell* is also in hand, and the *Ghurka, Scorpion* and *Cossack* are expected to arrive immediately to be refitted. The scout *Patrol* arrived for that purpose on July 14th, and the destroyers *Mosquito* and *Grasshopper* on the 20th. Several of the yard craft went to Portsmouth during the Coronation review, and the Commander-in-Chief at that port has expressed his appreciation of the manner in which they were handled and the service they rendered. The letter stated that not the slightest accident occurred, and added that this was greatly to the credit of the officers and crews. It has been announced that the new floating dock is to be berthed in Saltpan Reach, but nothing has been heard as to where the dock is to be worked from. The general impression is that it will be worked from this yard, because we are more familiar with battleship repairs than our neighbours at Sheerness. It will, however, be much easier of access from Sheerness than from Chatham. It is believed by many that the day is not far distant when the Admiralty will increase the usefulness of this yard, so that we can accommodate *Dreadnoughts* and refit them. The difficulty at present is that the vessels cannot pass through the locks or be received into the docks. It seems to be generally understood that the depth of water in the river is the difficulty, but that is by no means the case. The armoured cruisers *Indomitable* and *Inflexible* were got in without any trouble when they came in for refit. At the beginning of August Captain N. Grant-Dalton will relieve Captain A. D. Ricardo as captain of the yard, the latter officer's time having expired. It is interesting to note that three of the fifteen engineer commanders who have recently been promoted to that rank belong to this port. Engineer-Commander H. E. Rock has been appointed to our new cruiser, the *Chatham;* Engineer-Commander J. Maxwell is serving in the *Aquarius,* repair

ship of the Third Destroyer Flotilla; and Engineer-Commander J. J. Kirwin is the second assistant to the engineering manager.

Sheerness Dockyard.

Instructions have now been received for laying the keelings of the Medway floating dock, which is being built by Messrs. Swan, Hunter & Wigham Richardson, in Saltpan Reach, near Port Victoria. The dock is to be ready for delivery before the end of the year. The battleship *Commonwealth*, of the Nore Division of the Home Fleet, when at Spithead for the review received from Lady Northcote the gift of the people of Australia. A number of Australian visitors were on board the vessel, and they were received on the quarter deck by Vice-Admiral Prince Louis of Battenberg and the captain. The gift, which is of Australian design, material, and workmanship, consists of a silver challenge shield, a silver model of Captain Cook's ship the *Endeavour*, and an endowment fund to provide prizes for the men. The ocean-going destroyer *Nautilus*, whose delivery had been delayed for various reasons, is now ready for commissioning for service in the First Destroyer Flotilla, in relief of the *Rother*, one of the "River" boats, which is to join the Nore Flotilla. When the *Nautilus* joins the First Flotilla it will then consist of twelve "Tribal" destroyers and twelve of the ocean-going class. The destroyer *Stour* has completed her refit and rejoined the Third Flotilla. Quite a large number of destroyers are in hand refitting, including the destroyers *Zebra* and [illegible] which were damaged in collision during night exercises; the *Boyne* and *Usk*, of the Third Flotilla; the *Recruit* and *Express*, of the Devonport Flotilla; the *Charger*, of the Sixth Flotilla. The refits of Torpedo Boats Nos. 11 and 12 have been completed, but Submarine C 9 is still in hand. In view of the large number of vessels using Harwich as a base, the Admiralty have given directions for C115 (ex *Tourmaline*), to be stationed there as a floating coal depot, her place at this port being taken by C109 (ex *Agincourt*), which has been fitted with the latest appliances for coaling ships and is capable of storing nearly 10,000 tons of coal. The battleship *Camperdown*, the last of the "Admiral" class, which was towed here from Harwich, has been berthed in Kethole Reach, where she will remain until she is removed by the Shipbreaking Company of London, who purchased her at Devonport for £28,000. The value of the dredging operations in the new channel over Sheerness bar was again shown on the recent departure of the battleship *Hercules*, which left the Medway three hours before high water and had six feet to spare under her keel. Engineer-Captain D. W. C. Griffin, who had served on the Home Fleet staff here since May, 1909, has retired from the Service on account of age.

Pembroke Dockyard.

The cruiser *Amphion* is making rapid headway. The framework and all the deck beams are in place, the outer plating is being proceeded with, and the heavy plating on the lower and upper decks is also being expedited. As to the cruiser *Active*, the machinery has all been put on board. The decks over the engine rooms have been closed down and the large casings over the engine hatches, which were built away from the ship, have been put in place. The basin trials will take place about the end of September, and the vessel will no doubt be out of hand by the end of the year. Messrs. Hawthorn, Leslie & Co.'s staff accomplished the work of getting the turbines of the *Active* on board very smartly, the six being placed in the vessel in two days. It is understood that our new ship will be laid down on No. 1 slip, where the *Defence*—the last vessel built there—was laid down in February, [illegible] Torpedo Boats Nos. 033, 041, 045 and [illegible] of the [illegible] flotilla, which accompanied the Devonport Flotilla on a night run to Waterford, returned on July 11th. No. [illegible] was damaged in collision with the destroyer *Nagasaki* at Waterford, and she has been docked for repairs. Her injuries are on the starboard quarter. The other vessels in hand are the destroyers *Itchen* and *Kennet*. Improved arrangements are being made for distributing hydraulic power at the yard, the existing sources of power having sometimes proved inadequate. Additional power will also be necessary for working some of the machinery proposed to be installed in connection with the new [illegible] slip for destroyers which is to be constructed. Mr. J. R[illegible], assistant shipwright at this yard, is to be congratulated, he having been elected to relieve Mr. A. H. Gould as constructor in charge at Haulbowline, the latter officer taking up an appointment in connection with the Greek Navy.

THE STEWARD STEAM GENERATOR.

IN our issue of January [illegible] we gave a full description and illustration of a new form of steam generator which had not only the merit of small weight and volume for its evaporative capacity, but also had the useful quality of being practically "fool-proof." On that occasion we expressed our interest in the future of this boiler, which is the invention of Mr. G. R. Steward of 34 York Road, Southend, and we have been looking forward to the development of the matter. Recently we had the pleasure of being present at a test of the evaporative capacity of a boiler of this type, and we confess that we were not only surprised at the duty performed, but were struck with the capacity of the boiler in giving dry steam under working conditions of considerable stress. 210 lbs. of water were evaporated in 41½ minutes with a consumption of 1·55 gals. of petroleum, which is at the rate of 17 lbs. of water per lb. of oil. As the boiler was fitted with an efficient superheater the H.P. developed from the steam generated through an efficient compound engine should be at least twenty, and, having regard to the small size of the boiler, *viz.*:—2 ft. 6 ins. high by 2 ft. diameter and a weight of about 6 cwt., the result is most satisfactory, and clearly indicates that in spite of what has been done in the design of boilers in the past there is still room for beneficial development. We are of opinion that the Steward boiler is well worthy of further development, judging from the results obtained and having regard to the simple and inexpensive character of construction.

THE "PARAGON" STEERING AND REVERSING PROPELLER.

THIS interesting propeller is now making headway, in many applications, for marine propulsion, and the "Paragon" Marine Propeller Company, of 11, Bush Lane, Cannon Street, London, inform us that they find it difficult to cope with the demand both at home and abroad. At the moment they have in hand a most interesting application of the invention, in the form of a 35-ft. boat on the Thames, in which two propellers will be driven from one engine, no rudder being necessary, for both steering and propulsion. Ahead, astern, port or starboard is accomplished by means of the propeller. Moreover, what is most attractive is the fact, that without slowing the engine the thrust can be varied on the boat and thus the boat-speed regulated.

Instructions for a large installation on the yacht of a prominent member of Parliament have recently been received, in which Mr. Durtnall's well-known electrical system will be used for the driving of the propeller, and the electrical power generated by means of a new type of internal combustion engine, which was described in his recent paper before the Institute of Marine Engineers. It is anticipated that at least 20 per cent. more work will be extracted from the fuel by this means. This is the third repeat order from the same source for this novel and efficient propeller.

We are informed that the sale of the American patents for the "Paragon" propeller is about to take place, but competition with this country is, in that case, debarred.

GAS-COAL AND OIL-ENGINED VESSELS.

ENQUIRIES during the past month have been more in evidence than orders for gas-engined vessels, these, however, may be booked later as a result of pending negotiations. Several oil cargo steamers to meet the growing demand for oil fuel and other purposes have recently been placed on order, and it is probable that one or more of these will be fitted with oil gas engines, such would only be fitting and opportune, and the question of cargo working now admits of easier solution than formerly, although experience is still lacking to justify the claim to the most suitable and convenient form in which to apply the power—steam, electric or pneumatic. At the International Rubber Exhibition held during the end of June and beginning of July, several of the rubber producing territories gave in their pamphlets indications of a development of oil fields; of these, Trinidad appears to be a promising place for Imperial service in view of the increasing number of Government vessels fitted for burning oil fuel, thus enforcing the necessity for colonial and crown lands being encouraged to not only develop oil fields, but to stock quantities for local distribution. It is well known that in Australasian waters New Zealand is capable of development in respect of oil supply, so that there are many portions of the Empire where stocks might be kept from local production, and the argument which applies to oil for fuel to produce steam also applies to the manufactured oil which is suitable for direct use in the cylinders without the interposition of the boilers. The British Admiralty have now under consideration the question of oil-driven engines to be fitted in some of the vessels projected for construction, so that the need of many supply stations is becoming more important. The new Engine (Motor) Co. have been giving special attention for some years to the production of a two-stroke engine, which will be reliable and economical. Their motor for aviation has been a success and their most recently constructed marine engine bids fair to demonstrate the conviction of Mr. Mort that this engine can hold its own with any four-stroke engine, in economy and flexibility. The Blackstone engine works with crude oil and our attention was called to it at the Agricultural Hall as a handy engine for marine work, in which Scotch shale and other crude oils may be used, the cost of the oil is less and the consumption is stated to be about half a pint per b.h.p. The engine is started by compressed air stored while the engine is working. Messrs. Davey, Paxman & Co. had a suction gas engine and producer on show, a type which awaits development for marine service to follow on after the experimental work done in the "Rattler." This firm has a very complete catalogue sheet giving the standard sizes and full particulars with prices of their "Paxman" gas engine and plant for land work. A similar one for marine work is much wanted, as standardization would greatly assist both buyer and seller, reducing cost prices and tending to economy. It is difficult to standardize with a varying market, but there are engines in demand within a short radius of power of each other which might be made duplicates in respect to many of the parts. Messrs. Brooke have a good type of marine motor, upon which they are still exercising their ingenuity and we hope to illustrate their latest and most perfect production in the course of next issue. Messrs. Crossley's exhibit at Islington was worthy of attention, the name is sufficient to recall the history of the gas engine, although there was nothing to show for the marine service.

The arrival of the *Holzapfel I.* in the Thames with a cargo of coal from the Tyne has excited a good deal of interest and speculation as to the results. These have been so far satisfactory, and with the experience gained will be improved upon in future runs. The Fottinger hydraulic reversing and regulating gear seems to have given satisfaction. The experience in connection with the *Vulcanus* is being awaited with expectation and it is such experience that will encourage or deter prospective owners who are considering the question of gas engines for vessels on the eve of being placed on the market. Some of the British types of oil engines are now being developed in the right direction and with care and attention to details these will come to the front, after the quiet and cautious persistency now being pursued has been crowned with deserved success. The adoption of oil engines for small craft by the Japanese has been very marked, and the way that the average man manages the machinery as these boats ply to and fro in the harbours and bays shows the adaptability of the race and the application to master technicalities; such are the thoughts suggested to one witnessing the passing to and fro of the boats in question in Japanese ports. On the Continent the use of the oil engine for small craft and canal barges is becoming more frequent, and in Antwerp this is specially the port where such can be used with great effect, from the ferryboat, which is plying across the dock for passengers to save many weary footsteps, to the large barges which traffic through the canals or around the coast line. For canal and coastal traffic the oil engine is an ideal motive power agent. When enquiries can be met by a standardized and reliable motor produced by reliable firms, the orders will assuredly follow.

MESSRS. MATTHEW KEENAN & CO., LTD., have recently secured the contract to cover with their various compositions, boiler, pipes, etc., at the Queen Mary's Hospital, Carshalton, amounting altogether to over 100,000 feet.

The 34th annual volume of "The Marine Engineer and Naval Architect" begins with this issue, and affords a favourable opportunity for intending subscribers to send in their names. They are respectfully referred to the form printed on page xxv., which should be filled up and sent to the office at 3, Amen Corner, London, E.C. The annual prepaid subscription is 7/6, including postage, sent direct from head office to any address.

The 33rd volume, tastefully bound, is now on sale. 478 pages of good reading matter, price 7/6, or by post securely packed, United Kingdom and Canada, 8/-; other countries, 8/6. Binding cases may now be obtained from the publishers, price 1/6, carriage 3d. extra. A complete index to volume xxxiii. is presented with this number. We shall be pleased to undertake the binding of readers' parts in publishers' cases at 2/6 per volume. Prices for other bindings quoted for on application. Back numbers in stock.

LAUNCH OF THE "NEW ZEALAND."

THE launches in July had a notable send-off in the consignment to the water of the cruiser-battleship *New Zealand*, the first naval ship presented to the Imperial Navy by any of this country's overseas dominions. The vessel, which is being built at the charge of the New Zealand Government, was sent off the stocks at Fairfield on July 1st, in the presence of an immense and exceptionally enthusiastic concourse of spectators. The Fairfield Shipbuilding and Engineering Co. had pressed forward the work of completing the vessel up to the launching stage, owing to the presence in this country of the many distinguished visitors from the Colonies, many of whom were present at the launch. The christening ceremony was performed by Lady Ward, the wife of the Rt. Hon. Sir Joseph Ward, Bart, Prime Minister of New Zealand.

The *New Zealand*, which when completed will displace about 19,000 tons, is an armoured vessel of 590 ft. in length, 80 ft. beam and 26 ft. 5 ins. draught. She will be propelled by Parsons' turbines driving four shafts developing 43,000 I.H.P. to give a speed of 27 knots. The *New Zealand* will carry eight 12-in. and four 6-in. guns, and two 21-in. torpedo tubes. She was ordered 15th March, 1910, laid down 21st June, 1910, launched as above stated and is to be completed by June, 1912.

NEW TIDE RECORDER.

THERE are many instances in the ordinary work of a navigator where the approximate height of the tide is an important matter for determination, which under ordinary circumstances is arrived at by a process of calculation. Take for example, when caught in a fog not far from land and uncertain of his position, the only method a navigator has of finding his position is by taking a series of soundings and comparing the same with the soundings given on the chart, but before making the comparison the height of the tide above low water level must be calculated in order to reduce the soundings to the chart datum. Or again, when entering a tidal harbour it is necessary to know if the tide has risen sufficiently high at a given time to have the required depth of water over the bar, or equivalently he may want to know at any time the depth of water over a particular bank or shoal. Further, when anchoring in places where there is not much water it is important to know if the vessel will remain afloat at low water.

The calculations in matters of this kind are rendered unnecessary by the use of a simple device which Messrs. Heath & Company, Ltd., of London and Crayford, have put on the market under the title of the Lenthall-Baugh Tide Indicator. This instrument gives at a glance the height of the tide above the low water level of ordinary spring tides at any hour between high and low water, also the time from high tide that the tide should be any particular height, and thus calculation from special table or diagrams is entirely avoided.

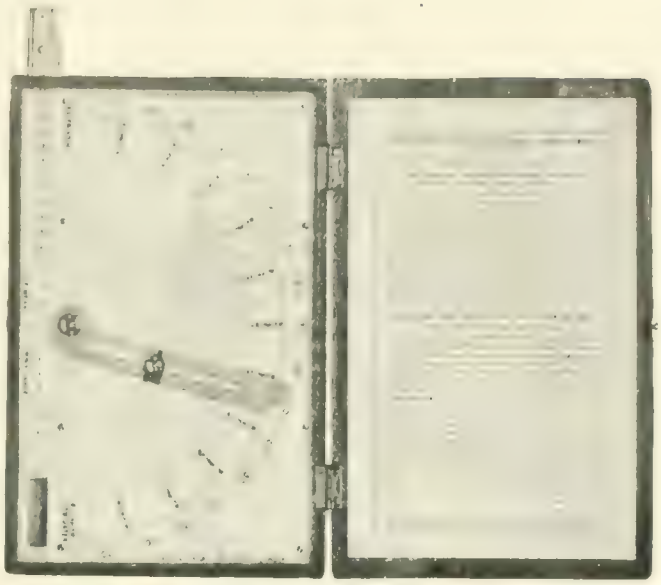


Fig 2.

The indicator is made in two forms. The mechanical model is shown in Fig. 1, and can be screwed securely to any bulkhead or partition. In using this type the pointer F is set to the figure on the outer scale representing the depth of water at ordinary spring tides. The arm D is now moved round about the centre of B, in the position indicating the actual time intermediate of high and low water at which the depth is required. The arm D and the pointer F being geared together, the pointer during the movement comes back to the figure corresponding to the intermediate period, and thus the depth can be read directly off the scale without further trouble.

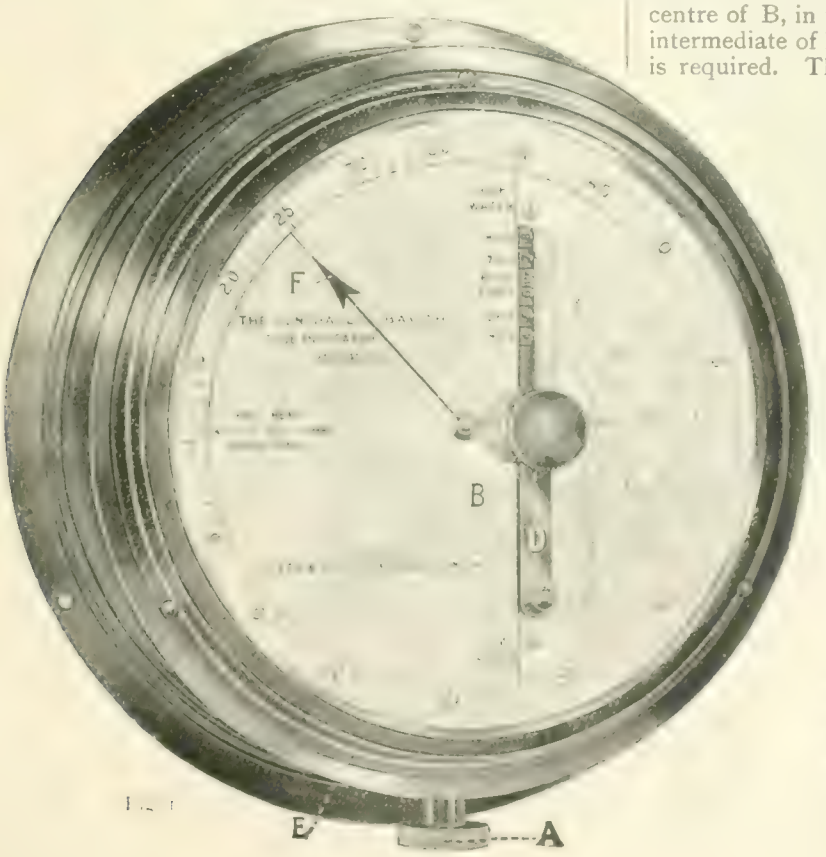


Fig. 1

The simple model is shown in Fig. 2, and is made of wood in the form of a box. In this type the arm is swung round to "high water," and the pointer on the arm is adjusted to the depth of water represented by the parallel lines in relation to the side scale. The arm is then swung round to the desired time after "high water," and the depth is read off from the position of the pointer relative to the scale.

As an interesting feature affecting the admitted reliability of the instrument, it may be mentioned that an extended trial of some weeks has been made on one of the steamships of the Trinity House, and as a result of the trial the Elder Brethren have ordered four of these instruments to be supplied for use on board their vessels.

FOREIGN NOTES.

FRANCE.—The new steamer the *Corsica*, belonging to the Compagnie Fraissinet and built at Newcastle, is on her way to Marseilles where she is to undergo her contract trials in presence of the postal commission. The steamer *Aida* from Nantes has arrived at St. Nazaire for her trials. This vessel which has been built at the "Chantiers de la Loire," the time occupied in building being one year, has cost 780,000 francs. She carries fresh water tanks with a capacity of 70 tons. The vessel is built of teak wood and is superbly fitted out. Her speed is 13 knots. She belongs to an English company which is under the control of the Egyptian government, and is to be employed for revictualling the Red Sea lighthouses. The interior is divided into compartments to carry the gasoline and petroleum required for each lighthouse, and below there is another compartment for cement, hydraulic lime and building materials.

A large steam yacht has just been delivered for the Prince of Monaco by the Forges et Chantiers de la Meditérranée, in whose yard she was constructed. The *Hirondelle*, for such is her name, went through her trials in a most successful manner and is to undertake her first trip on the Atlantic Ocean, as she is to go to Canada, where she is to be used in scientific research, of which the Prince is a zealous devotee. She displaces 1600 tons. Her propelling machinery consists of two twin triple-expansion engines, each independent of the other, developing 2200 h.p. and giving a speed of 15 knots, the boilers working under natural draught. Wireless of the latest description is installed and she has also an apparatus for submarine sound signals. The vessel will no doubt be everywhere admired as a notable production of the French shipyard.

NEW ZEALAND.—A twin-screw steamer of steel is required for Otago for tug and salvage purposes. Tenders are invited up to the 6th September to be addressed to the Harbour Management in Otago, New Zealand, from whence the terms and particulars will be forwarded on application. Plans and specifications can be inspected at the office of the High Commissioner for New Zealand, London, at the Mersey Harbour Board and the Clyde Navigation Trustees. Copies can be obtained from the High Commissioner on deposit of £10 for plans and 10s. 6d. for specifications alone.

GERMANY.—The *Freemantle*, a new tank steamer of the German-Australian Steamship Co., has arrived at Hamburg and went into dock to have her bottom painted. The trial runs were very successful at Geestemunde, where she was built. The machinery consists of a triple-expansion condensing engine, and on the trial run a speed of 14 knots per hour was obtained.

KIEL.—The new floating dock of the Admiralty has been stationed in the inner harbour where it is secured to eight 30-ton stone anchors. The enormous size of this floating dock makes all ships appear small in comparison. It has a length of 230 metres and is able to take a ship of 40 000 tons. It is said to have cost seven million marks. This is a further proof that our German competitors are losing no time in equipping themselves so that they can cope with even larger vessels than they are now building.

The s.s. *Hellas* of the Hamburg-America line has been bought by Japan. She was built at Stockton in 1894, and she is of 2,438 gross tonnage. A Buenos Aires shipping firm has bought the *Amasis* from the Hamburg-Cosmos Line. This steamer was built in 1896 at Glasgow and is of 4,552 gross register tons. £11,000 was the purchase price paid for her.

The formerly British steamer *Bradford*, sold to Germany when she was renamed *Hanna*, has now been sold to Turkey. She left Hamburg showing the Turkish flag and bearing the new name *Sivin*, given to her by the purchasers. The *Harlingen* of Sunderland, able to carry 1,550 tons, has also changed hands. She has been sold to Germany for £15,500.

ITALY.—Messrs. M. W. Martinolich, of Lussino, recently founded a new steamship line and purchased three cargo steamers of a new type in the United Kingdom, each of 7,000 tons burden (the *Africana*, *Carmen* and *Butterfly*). Later they also bought another vessel of 8,000 tons. Two other cargo steamers, it is said, will also be required, of great tonnage, so as to have a fleet of six ships of the newest type. We trust British builders will take note of this.

The *Societa Union* of Ragusa also recently bought the new cargo steamer *Daksa* (7,000 tons) in the United Kingdom. This ship is built on the latest principles of naval architecture.

The Austro-Hungarian Merchant Marine is continuing to build large vessels. Recently the new steamer *Wien* of the Austrian Lloyd Co., constructed at the Lloyd yards, was successfully launched. The *Wien* is a fine steamer of about 9,000 gross tons making 18 knots per hour. She will be employed for the Alexandria line and fitted with every convenience to carry 150 first-class, 80 second and 30 third-class passengers. Naphtha is to be used as fuel for the eight boilers, each of which has four furnaces, instead of coal. Naphtha is also to be adopted for the other Lloyd steamer *Helouan*, now being built. Consequently the largest Mediterranean vessels burning liquid fuel will be Austro-Hungarian. The power of the engines of the *Wien* is 10,000 h.p. The success of the use of this fuel on a large scale is awaited with great interest in Austrian shipbuilding circles.

JAPAN.—We hear that our enterprising allies have placed orders for two battleships with the shipbuilding yards of Mitsu Bishi in Nagasaki and Kawasaki in Kobe, neither of which has as yet been engaged in building an armoured vessel. The displacement of each ship is to be about 27,000 to 28,000 tons. The artillery equipment is to consist of ten to twelve cannon of 12-13.5 inches diameter. Considering the achievements of Japan we have no doubt that the results will be most satisfactory.

CATALOGUES RECEIVED.

Messrs. Wailes, Dove & Co., Ltd., Newcastle. Patent bitumastic solution and enamels.

Messrs. Perkin & Co., Ltd., Leeds. Price list and particulars of vertical petrol and paraffin engines.

Bowesfield Steel Co., Ltd., Stockton-on-Tees. Steel sheets and accessories.

Hoffmann Manufacturing Co., Ltd., Chelmsford. Ball bearings applied to machine tools.

Siemen Bros. Dynamo Works, Ltd., London. Installation accessories.

Messrs. E. G. Appleby & Co., London. "Phœnix" liquid controllers and high-speed friction saws.

ROYAL MERCHANT SEAMEN'S ORPHANAGE.

A FESTIVAL in connection with the Royal Merchant Seamen's Orphanage was held under the auspices of the Princess Louise, Duchess of Argyle, at the Royal Botanic Society's Gardens, on July 22nd, when there was a large gathering of subscribers and sympathisers. The special object of the festival was to arouse enthusiasm and raise funds to assist in covering an overdraft on the working account of the orphanage, and both these purposes were fulfilled. It was a pathetic sight to see the boys and girls from the orphanage at Snaresbrook giving their drill display and to hear them lifting their voices in harmonious song, reminding one of their condition in life and appealing to the heart and purse strings for the support of such an institution.

Purses containing notes of the amounts subscribed and collected by the stewards acting on behalf of the Orphanage, were handed to the Princess, and the total amount proclaimed was about £3,600. The claims of the Orphanage on the sympathy and help of all seafarers and of those who in any way are benefited by business done on the face of the waters, are commended for consideration.

THE ROYAL NAVY LIST AND NAVAL RECORDER for July has just been published by Messrs. Witherby & Co., High Holborn. The publication is an extremely useful one and merits the support of all persons interested in naval affairs.

The Worshipful Company of Shipwrights.

Clement Godson, Esq., M.D., C.M., V.D., Master.

On July 17th, Dr. Clement Godson, M.D., C.M., V.D. was installed as Master of The Worshipful Company of Shipwrights with Mr. J. Bell White, the Right Hon. Sir Edward Clarke, K.C., P.C., Colonel and Alderman Sir William H. Dunn and Sir Philip Watts, K.C.B. F.R.S., as Wardens. The following gentlemen were elected to the Freedom and Livery of the Company:—Mr. A. W. Simpson of the Earnedd Shipbuilding and Engineering Co., Mr. J. H. Boddy (Vickers, Ltd.), Mr. G. J. Carter (Sir W. G. Armstrong Whitworth & Co.), Mr. H. B. Rowell (R. & W. Hawthorn, Leslie & Co.), Mr. T. G. Owens (Vickers, Ltd.), Mr. P. S. Brown (Caledon Co.), Mr. J. Tawse (Caledon Co.) and Mr. C. Coburn. In the evening of the same day a Livery dinner was given at the Fishmongers' Hall, London Bridge, to which had been invited a large number of guests to meet the Lord Mayor and Sheriffs. The Master (Dr. Clement Godson) presided over a distinguished company which included the Lord Mayor, the Earl of Lytton, the Earl of Dunraven, Lord Devonport, P.C., Sir Thomas Barlow, Bart., president Royal College of Physicians, Sir W. H. White, K.C.B., F.R.S., Admiral Sir M. Culme-Seymour, Bart., Sir Henry T. Butlin, Bart. (president Royal College of Surgeons), Sir Charles Inigo Thomas (secretary to the Admiralty), Alderman Sir J. F. Ritchie, Bart., Sir James Crichton-Browne, M.D., etc., Dr. S. West, Rear-Admiral Sir Adolphus A. F. Fitzgerald, Surgeon-General W. Beatty, C.M.G., V.C., Sir Edward H. Busk, Prime Warden of the Skinners Company, Sir Henry Morris, Bart. (president Royal

Society of Medicine), Mr. Alfred Aston, Col. Sir Reginald Hanmel Dr. F. de Havilland Hall, F.R.C.P., Rear Admiral F. F. Inglefield, Mr. Robert Colray, Master of the Carpenters Company, Mr. F. O. Streeton, Master of the Skinners Company, Mr. J. Bell White (1st Warden), Sir Edward Clarke (2nd Warden), Col. and Alderman Sir W. H. Dunn (3rd Warden), Col. Sir Philip Watts (4th Warden), Mr. C. B. Lockwood, F.R.C.S., Sir Frederick Bridge, Prof. J. H. Biles, Dr. R. A. Gibbons, M.D., Mr. Alexander Siemens, President Institute of Civil Engineers, Mr. C. Gould May, M.D., Mr. D'Arcy Power, F.R.C.S., Alderman Sir William Treloar, Prof. Welch, Sir J. Fortescue Flannery, Lt.-Col. the Hon. T. A. Brassey, Mr. T. L. Devitt, Col. R. Saxton White, Mr. R. R. Bevis, Col. T. Davies Sewell (treasurer), etc.

After the usual loyal toasts, Sir W. H. White proposed "The Imperial Forces of the Crown," which was responded to by Admiral Sir M. Culme Seymour and Surgeon General Babtie. Sir Edward Clarke gave the "Lord Mayor, Sheriffs and Corporation," on whose behalf the Lord Mayor suitably responded.

Professor Biles, in toasting "The Mercantile Marine," said that the merchant shipping of the world, and more especially of this country was stupendous. 40,000,000 tons of shipping were now afloat, a figure which clearly indicated the vastness of the industry. Mr. T. L. Devitt, in responding, contrasted the *Great Eastern* with the recently launched White Star mammoths, and said that the progress which had been attained to-day was due to the skill and ingenuity of the naval architect and marine engineer. The toast of "The Visitors," proposed by Mr. J. Bell White, was responded to by the Earl of Lytton and Sir Thomas Barlow.

The Earl of Lytton said: "I am sure that I shall be expressing the feelings of all your guests when I say that we are very grateful for the hospitality which has been extended to us to-night by this ancient and honourable Company. We have had an excellent dinner, we have found ourselves in most distinguished company, we have listened to very eloquent speeches and, lastly, our health has been very cordially drunk. For all these things we offer you our most sincere thanks. I confess my vanity was greatly flattered when I first found myself selected from this distinguished company of guests to respond to this toast, but as the dinner proceeded and I had time to think the matter over, especially while I listened to certain allusions in the speeches which have already been made, I began to feel more humble, for I realized why it was that I had been singled out for this honour. It is because, like the Lord Mayor, I also am a member of an unreformed Corporation. We have been reminded to-night that we live in an age of progress, and one of the sad results of what is called progress is that some things have a tendency to become obsolete. I presume I have been selected to speak to this toast because, like the hansom-cab driver, I represent that which is becoming obsolete—an hereditary legislator. I will not follow the example of the gallant admiral who responded to the toast of the Imperial Forces and give you my reflections on the history of the depreciation of the House of Lords. That would be too melancholy a topic for so convivial an occasion. I will dismiss the subject by saying that I consider that agitation is as ill-deserved and as profitless as the depreciation of the navy of which he spoke. Whatever may be said against the House of Lords I for one am proud to belong to it, I shall always uphold it and I am ready to serve in it as long as I am permitted to do so. As Sir William White said, this is a moment to talk, not of institutions, but of men, and I want to offer my personal thanks to your Master for his kindness in inviting me to this dinner. I see Dr. Godson in a new light to-night. Hitherto I have known him rather as a launcher of men than of ships. But I know him well enough to be convinced that he would grace any position to which he may be called. It was with the greatest regret that I heard of his recent illness, and at one time I feared that I might be deprived of the pleasure of meeting him to-night. I should like to take this opportunity of congratulating him on his recovery and wishing him all success in the honourable position which he now holds as Master of this Company. In whatever capacity I have known Dr. Godson, whether it be as professional adviser or private friend, whether as guest or host, I have always found him the kindest, most genial and best of men. In the name of your guests I offer you our most cordial thanks."

The toast of "The Shipwrights' Company," proposed by Mr. Aston, was cordially greeted, and Dr. Godson, in replying, said: "In responding to this toast I thank Mr. Aston very warmly for the kind way in which he has spoken of our Company and for the far too flattering words he has used in connection with myself, and I thank you all for the cordial manner in which you have received the toast. As regards our Company I can truthfully say that, having been one of its Liverymen for upwards of twenty-seven years, I have never known it in such a condition of prosperity, and with such an aspect of increasing prosperity, as at the present time. During the last two years no less than twenty-two new members have joined our Livery, eighteen of whom are in some way or other connected with shipping, many of these in most prominent and leading positions in regard to it, for example, Lord Inverclyde, Sir James Lyle Mackay, now Lord Inchcape, and Sir Charles Parsons. Surely this speaks for itself. Probably Lord Pirrie, when master two years since, and Professor Biles, my immediate Past Master, and others, may have influenced some of these in wishing to come into our Company, but I am convinced the great attraction to them was the knowledge of the good work we *have* done and *are* doing in providing for the technical education of students in the art of shipbuilding, and in naval architecture, notably since 1897, when Sir William White occupied the chair I now do, and Alderman Sir Horatio Davies was one of his wardens, besides being Lord Mayor of London. They took up the matter warmly, and made an appeal to the City Companies and the great shipowners, with the result that £4,000 was collected and put in trust, the deed bearing date April, 1899. Since then, by the exertions of certain members of the Company, another £2,000 has been collected, so the money now invested stands at about £6,000. This has enabled us, in addition to giving pecuniary assistance for expenses, to give annual grants for prizes to deserving students in evening classes at all the great naval ports where Royal dockyards exist, and in a considerable number of centres of shipbuilding for the mercantile marine. The amounts, though small, are found to be of great value to young men of the working class for purchase of books and mathematical instruments required for their instruction. Ever since the formation of the Educational Fund the Fishmongers' Company, which has so kindly lent us this hall this evening, as on so many former occasions, and which I am glad to see so well represented this evening at our table among our guests, has given £50 per annum on a triennial grant at the disposal of the Committee of the fund—and, in 1908, the Skinners' Company generously followed its excellent example. We are equally glad to see that Company well represented among our guests to-night. Besides the Master, we have a Past Master, my friend and kinsman, the proposer of this toast. I know what kindly feelings he had towards us in regard to allowing the triennial grant of £52 10s. to go on for another three years when the first came to an end a few months since, and for this continuation we are very appreciative. With these grants and our own invested trust money we are able to give three scholarships of £50 annually to selected promising students in naval architecture in the University of Glasgow, the Royal Naval College, Greenwich, and the Armstrong College, Newcastle-on-Tyne. Besides the Fishmongers' and Skinners' Companies, we are indebted for pecuniary assistance to the Goldsmiths', Clothworkers' and Carpenters' Companies, and we hope to see others following their example. Sir William White, the chairman of the Trust Fund, who has unquestionably done more for it than anyone else, could tell you much more than I as to its results, but this I know, from having been now for several years a member of its committee, that not a few of those students who, on account of impecuniosity, would have been unable to continue having tuition without the assistance given them by our Company, have reached positions of importance and responsibility in the shipping service of the Admiralty, and in the mercantile marine. It was found possible to include two new centres last year in the list of educational authorities to whom grants have been made—the Glasgow and West of Scotland Technical College and the Clydebank Technical Institute. But, owing to the limited funds at our disposal we, the committee, to our great regret, have found it impossible to give assistance to some very deserving cases recently brought to our notice. So, as our income increases there is plenty of scope for us to do more, and it is a *national service* we are rendering. I should like from the chair to offer

our congratulations to those of our members who have recently received from His Majesty coronation honours. First, Lord Brassey, Past Master, who has been raised to the dignity of an Earl. He was to have been among us this evening, and most kindly promised to receive us by proposing one of the toasts; but he has been unexpectedly prevented from coming. But we have his son, Old Brassey, with us. I rejoice to see him, and I will ask him to accept our hearty congratulations, and convey them to his father. Second, Sir William T. Lewis, a member of the Court of Assistants, has been created a Peer under the title of Baron Merthyr of Senghenydd, in the county of Glamorgan, and third, Sir James Lyle Mackay has also been made a Peer, making the title of Baron Inchcape of Strathnaver in the county of Sutherland. We congratulate them both warmly. We now come to Sir John Wrench Towse, who is happily here with us, and we offer him our sincere congratulations on his knighthood. And last, but not least, we come to Sir Charles Parsons, whom I ought to have admitted this evening a member of the Court of Assistants, but his engagement would not allow him to leave Newcastle. Not only have we to congratulate him on his coronation honour of K.C.B., but upon one he tells me he sets a much greater value on, just awarded to him by the Council of the Royal Society of Arts (with the approval of the President, H.R.H. the Duke of Connaught, who, I understand, presented it to him on Friday last at Clarence House) the Albert Medal of the Society for the current year 'for his experimental researches into the laws governing the efficient action of steam in engines of the turbine type . . . . The beneficial results which have followed upon these inventions include a cheapening of the production of mechanical power, greater economy and speed for steamships, and the first successful solution of the problem of rotary engines, which long had baffled many other inventors.' We agree with Sir Charles that this medal is something to be proud of, but more so his laborious work which gained it, and we feel that we have to congratulate *ourselves* still more on having so scientific and distinguished a man a member of our Court of Assistants, as he will be when he has time to come up to be admitted as such. We regret very much that so many of our distinguished members have been prevented unavoidably from attending this dinner to-night. We miss Sir Thomas Sutherland and Lord Pirrie greatly. The latter asked me to express his regrets. He is now on his way to America in his latest ship, the *Olympic*, the model of which many of you must have seen in Cockspur Street as a coronation decoration, looking straight up Pall Mall, a triumph in shipbuilding, the largest ship afloat, I understand. I saw the model just now still up, as I drove down here, with '50,000 tons' written beneath it, but, of course, with the work the Shipwrights' Company is doing in education in the art of shipbuilding it is certain to be surpassed before long. In conclusion, I hope to prove myself worthy of the proud position I occupy as Master of this important Company—I shall at all events, do my best in its interest—I cannot do more."

Arms of the Shipwrights' Company.

REVIEWS.

Marine Engine Design. By [illegible] Longmans, Green & Co., Ltd. Price 5s. nett.

[illegible] written by an American College professor on the design of some parts of a marine engine, [illegible] the results of personal work in supervising the building of marine engines [illegible] Department of Mechanics. In the issue that the treatment of the subject is dividing the work [illegible] the separate factors to be met with and the method of dealing with them, the book [illegible] purpose of the [illegible] text book knowledge from the standpoint of commercial production [illegible] day by day. The author [illegible] attention to the desirability of [illegible] in connection with the design of marine engines and wherever possible, [illegible] should be determined from [illegible] under as nearly as possible [illegible] be claimed that an engine has been designed for its work. This seems to us to be quite the proper [illegible] the branch of engineering [illegible] science, and must be conducted in relation to the latest results and not according to any rule or formulas laid down in text books in teaching the theoretical side of the subject. There is little in the book that has not already been treated by other authors, but it may be pointed out that the 172 pages of the book are not burdened with descriptive and illustrative matter of engines of various types that [illegible] all very soon after publication only have an historical interest.

Oil Fuel. By Sydney H. North and Edward Butler, M.I.Mech.E. London: Charles Griffin & Co., Ltd. Second edition. Price 6s. nett.

When the first edition of this book was published in 1909 it was conceded that it formed a concise record of the development and progress of the application of oil fuel to power purposes at the time. Much has been done in the subject since that date, and as the first edition has been out of print for some time, and the work is being continually asked for, it has been decided to issue a second edition, which is the one now under review. The book has been thoroughly revised by Mr. Edward Butler, and it now deals with all purposes for which liquid fuel can be applied, except internal combustion engines. As an indication of the scope of the volume, it may be said that it deals with the sources of supply, the economic aspect of liquid fuel, chemical combustion of fuel oils, conditions of combustion in furnaces, early methods and experiments, modern burners and methods, oil fuel for marine, naval, locomotive, road vehicle, launch and miscellaneous purposes, and last but not least oil fuel for domestic purposes. Some details as to certain oil [illegible] which were [illegible] too late for [illegible] have been included in an appendix. It would appear that nothing has been left undone to ensure the book not only being up to date, but to be complete in every essential respect as a thorough treatise on the subject.

The Corrosion of Iron and Steel. By J. Newton Friend, Ph.D. (Würz) and D.Sc. (B'ham.). 6s. nett. London: Longmans, Green & Co.

This volume represents very interesting matter of particular use to both the users and manufacturers of iron and steel. The author has collected in a comparatively short and useful book, all the numerous tests that have been made on the subject. It is to be noted that those who have published works on this subject have apparently been practically unaware of the work of previous investigators, [illegible] and it often is a fact that the same subject is [illegible] and even rediscovered by others. Literature on corrosion is so vast and so widely scattered that it has hitherto been exceedingly difficult to become thoroughly acquainted with it. The author commences with a description of iron generally, its history and con-

omic value, and points out that the call for iron has increased so rapidly since 1900 that if the present rate of supply be continued the demand in 1920 would be 100 million tons, and the question is then obvious, where will this increased amount of iron come from? It is therefore important to consider the corrosion of iron, and if means are discovered to arrest this corrosion, and thereby to prolong the life of iron, an immense service would be done to the world. The various questions as to the action of air and water upon iron are dealt with, and it is pointed out that it is not the water vapour in the atmosphere which stimulates the corrosion of iron, but it is the condensation of such vapour to form drops of liquid water. The action of steam upon iron is then discussed, and the various theories of corrosion are clearly set out. Then comes the particular question as to whether an acid is essential to corrosion, and from this question it is set out that liquid water and oxygen alone are sufficient to effect the corrosion of iron, but this is probably due to the inclusion of carbonic acid in the air. The author shows that pure water and pure air combined are without visible action upon pure iron, but it is difficult to get the iron generally pure. The rate of corrosion of iron exposed to natural forces is given attention to, and it has been found that with a large superficial area of water in which iron is immersed very largely extends the rate of corrosion. The flow of water if gentle which covers iron is found to very greatly increase the rate of corrosion as compared with when the flow is greatly increased. The action of various acids upon iron is gone into, and it is noted that cast iron which is to resist the action of acids should be made of the white variety if possible. The alternative is the use of alkalies with iron and it is stated that moderately strong solutions of caustic alkalies preserve iron from corrosion at ordinary temperatures for an indefinite time. Much other information is given in the volume which forms an excellent summary of all the tests existent upon the corrosion of iron or steel, and of great use to those interested.

Cold Storage, Heating and Ventilating on Board Ship. By Sydney F. Walker, R.N. 8s. nett. London: Constable & Co.

THIS is a welcome volume, treating as it does on very important subjects, which come within the scope of marine engineers to manipulate to the best advantage or suffer under when things are not what they should be. Under the first heading various systems of refrigeration are described, and the methods generally in use for obtaining cold are noted with description of the process. A valuable portion of the book is devoted to what are termed faults, and here the engineer who is, or may be, called upon to take charge of refrigerating plant, will find hints to guide him to put his hand upon what is wrong in a detail before a serious defect occurs. The portion of the volume devoted to heating describes the several systems which have been adopted, with the economic value of each, so also in connection with ventilation, a subject which for many sections of the machinery department, and the living quarters of the steamer's staff has not received the attention which it ought to have.

Notes on the Practical Duties of Shipmasters. By Captain W. Harry Wilkes, Lieut. R.N.R., extra master F.R. Met. Soc., younger brother Trinity House. 2s. 6d. nett. London: Chas. Griffin & Co.

THIS small volume has been published for the benefit of those officers who are looking forward expectantly to occupy the position of master, and a study of its pages will certainly serve a wise purpose in giving an idea of the duties of a master, and help to relieve the awkwardness attaching more or less to a new position. The various documents necessary in entering and clearing a vessel at terminal ports or ports of call, are all enumerated, with the mode of procedure in dealing with officials; hints as to the exercise of tact and firmness; survey certificates; advice as to loading and trim, with method of arriving at the stability for safe working; hints regarding bilges and ballast tanks, and other details in connection with the duties of a master.

THE INSTITUTE OF MARINE ENGINEERS.

Visit to Beckton Gas Works.

WE are indebted to the courtesy of Mr. Goulden, chief engineer of the Gas Light & Coke Co., for the opportunity of amplifying, and bringing more up-to-date, the description of the method of purification of gas as now carried out by the most recent system, termed the "rotation" system, under which the gas passes through sets of eight purifiers each, of which there are fourteen sets at Beckton. Under present-day conditions the gas is divided into several streams through these purifiers, each stream passing through two or more boxes in series and finally through two catch boxes. In general these purifiers are charged with hydrated oxide of iron, arranged in layers or wooden grids. In some cases manganese dioxide is used instead of oxide of iron. In passing through these purifiers the gas is freed from the impurity, sulphuretted hydrogen. In some cases some of the boxes are charged with slaked lime, the gas passing through these before the oxide boxes. The function of the lime is to remove the carbonic acid and more particularly to reduce the sulphur compounds other than sulphuretted hydrogen, the purifying material for coal gas now consists exclusively of oxide of iron at Beckton.

ASSOCIATION OF ENGINEERS-IN-CHARGE.—By the courtesy of the chief engineer of the London County Council the members of the Association were enabled to pay a visit to inspect the important sewage pumping works at Crossness, Kent, on July 29th.

THE MACHINE TOOL & ENGINEERING ASSOCIATION, LTD.—This Association has been formed as a result of a meeting of machine tool-makers and factors exhibiting at Olympia in 1910. The primary object of the Association was to exercise control over the organization and frequency of exhibitions, which, it was felt, were being overdone. A meeting was held in London with the promoters of the exhibitions to be held in 1912 and 1913, and in consequence only one show will be held in 1912, instead of the two originally proposed. This show promises to be most successful, and at the present date over £5,000 worth of space has been applied for. The registered offices of the Association are at 104, High Holborn, London, W.C.

INSTITUTE OF MARINE ENGINEERS.—Open Essay Competitions.—In addition to the essay competitions promoted by the Council of the Institute of Marine Engineers for the different sections of its membership, an award of £2, in books or instruments, or towards the payment of class fees is offered to apprentice engineers throughout the Kingdom for the best essay on the subject, "Improvements in Workshop Practice in respect to Machinery and Fitting." The paper to be the sole work of the competitor, to consist of, approximately, 2000 words, to be signed with a *nom-de-plume* (the name and address of the writer being also enclosed in a sealed envelope with the *nom-de-plume* written on the outside), and to be delivered addressed to "The Secretary, Institute of Marine Engineers, 58, Romford Road, Stratford, London, E.," not later than September 1st.

MESSRS. H. E. MOSS & CO., in their steamship circular, feel confident that the improvement in steam shipping will be continuous for some time to come. The large passenger companies, as well as those engaged in general trade, have done uncommonly well and are well booked ahead. For months past the regular lines, in order to fulfil their engagements, have had to charter a good deal of outside tonnage and must continue to do so. Trade in the United States is expected to boom shortly and reflect itself, as it always does, on Europe and especially England. Prices for new steamers continue to advance, being fully 10 per cent. higher than in January last. Oil fuel for steamers is now becoming more generally adopted, especially by the Navies of the world. The internal combustion engine for marine purposes has made rapid strides, chiefly for larger cargo steamers than hitherto. Messrs. Moss & Co. anticipate great changes and developments in the near future.

The White Star Line.

RETIREMENT OF TWO SENIOR ENGINEERS.

H. C. BOYLE, ESQ., R.N.R

J. W. ALEXANDER, ESQ., R.N.R.

TWO of the senior engineers of the White Star Line recently retired after long periods of sea service, and we have pleasure in reproducing their photographs, with a few notes on their careers.

Mr. J. W. Alexander is a native of Forfarshire, and served his apprenticeship at Dundee, where he was born in 1852. Technical schools were not so much in evidence fifty years ago as they are to-day, but to those who were eager to learn there was no lack of teachers, and in Dundee the services of David Hodge—honour to him—were at the disposal of young men like J. W. Alexander, who desired to improve their education by evening study after working hours. At the age of twenty he joined the White Star Line as sixth engineer of the *Oceanic*, and in 1874 was promoted to third engineer of the *Celtic*, transferred to the *Adriatic* in 1877, and promoted to second engineer of the *Celtic* also in 1877. Six years later he joined the *Britannic* as second, and was transferred to the *Cufic*, built at Belfast, in 1888. His promotion to chief engineer followed in 1889, when he was appointed to the *Runic*. He afterwards sailed as Chief Engineer of the *Cufic*, *Bovic*, *Cymric*, *Britannic*, *Celtic*, and in February, 1906, he joined the new *Oceanic*, thus bringing about a coincidence on his retirement in April of leaving the service from the new steamer of the same name as the old one he entered the service in. His continuous sea service covers a period of over thirty-eight years, in the course of which he has crossed the ocean 912 times, or a distance of some 3,100,000 miles. Our best wishes are with Mr. Alexander and his wife in his retirement.

Mr. H. C. Boyle was born in Greenock in 1856, and served his apprenticeship with Messrs. Rankin and Blackmore. When twenty-one years of age he went to sea from Liverpool in the Leyland liner *Ligurian*. After obtaining his certificates he sailed for a time as chief engineer. Joining the White Star Line he was in 1881 appointed third engineer of the *Arabic*, and about four years later he was transferred to the *Gaelic*. In 1886 he received promotion to second engineer on the *Adriatic*, and to chief engineer of the *Runic* in 1890. Eighteen months later he was transferred to the *Bovic*. In 1898 he under took the course of three months' training at Portsmouth in connection with the Royal Naval Reserve, and then rejoined the *Bovic*. He afterwards served in the *Germanic*, *Cymric*, *Celtic*, *Baltic*, and in 1907 he joined the *Adriatic*, remaining until his retirement at the end of May. We regret that the immediate cause of the retirement from sea service is due to want of robust health, but trust that a respite from the exac-

tions of duty will quite reinstate him in health and strength. Mr. Boyle's record of service is not quite so long as that of Mr. Alexander; he has, however, crossed the Atlantic 600 times, and has voyaged a distance of 1,800,000 miles. The changes made in the engine room and the responsibilities added to the engineers during the term embraced by the experiences of these engineers, have been many and great, embracing electric light, heating and ventilation of all passenger accommodation by mechanical means, refrigeration, forced draught, high boiler pressures, multiple-expansion engines, and other improvements carried out with a view to the greater comfort and additional luxury of passengers, as well as to the more efficient economy in carriage and means of transit.

The managers of the White Star Line, Messrs. Ismay, Imrie & Co., as a mark of appreciation of the successful service of these two gentlemen, presented each with a solid silver inkstand suitably inscribed.

Industrial and Trade Notes.

THE CLYDE AND SCOTLAND.

(*From our Own Correspondent.*)

Shipwrights' Wages.—The wages paid to, and the hours worked by the members of the Associated Shipwrights Society vary considerably in different shipbuilding districts, and for some time the shipwrights on the Clyde have been paid, generally speaking, from 1s. 9d. to 2s. 3d. per week less than those of the North-east coast of England, while their week has been slightly longer. Efforts at equalizing the rates to some extent have for a considerable time been made by the workmen; and in a conference with the employers, held in Edinburgh on 12th ult., it was agreed that Clyde shipwrights should be granted an advance of an eighth of a penny per hour as from July 26th, and another similar advance as from October 26th. The two advances will raise the average rate paid in the district from £1 17s. 1½d. per week to £1 18s. 3d. per week.

Six Months' Tonnage Output.—The tonnage output on the Clyde for the first six months of the year reached a figure which is the best on record with the exception of that for the corresponding period of 1906, which was swelled considerably through the launching of the Cunard Company's leviathan steamer *Lusitania* and the British battleship *Agamemnon*. The half-year's aggregate amounted to 309,850 tons and included such notable items as the battleship *Conqueror*, 22,500 tons; the P. & O. liner *Medina*, 12,500 tons; the Orient liner *Orama*, 13,000 tons; the Shire liners *Arglyshire* and *Shropshire*, each of 11,000 tons; the Booth liner *Hildebrand*, 10,000 tons; the New Zealand Shipping Co.'s liner *Remuera*, 11,200 tons; the Anchor liner *Cameronia*, 10,500 tons; the Union Castle liner *Gloucester Castle*, 8,000 tons, and the H.M. cruiser *Yarmouth*, 5,258 tons.

New Contracts.—Since the advent of July, fresh shipbuilding orders have been neither plentiful nor of the first importance, although the period has not so far been altogether barren, and fresh work is known to be pending. The following are the most important contracts which have been booked since the writing of last month's notes, given for the most part in the order in which the firms securing the contracts are found located on the river.

Messrs. The Fairfield Shipbuilding and Engineering Co., Ltd., Govan, have been commissioned by the Canadian Pacific Railway Co. to build two new "Empress" steamers for their Atlantic service. The distinguishing feature of these vessels will be their speed, and their horse-power is expected to be 45,000.

Messrs. Alexander Stephen & Sons, Linthouse, have received an order from the Compagnie Belge Maritime du Congo for a steamer of 7,500 tons deadweight.

Messrs. Barclay, Curle & Co., Whiteinch, who are at present building an oil-engined steamer, have received an order for another steamer of a similar type but larger and more powerful, from the East Asiatic Co.

Messrs. Mackie & Thomson, Govan, have contracted to build a small steamer for the General Steam Navigation Co.

Messrs. Napier & Miller, Old Kilpatrick, have received an order from Canadian owners to build an ice-breaking steamer of 1,600 tons, and about 260 ft. in length.

Messrs. John Brown & Co., Ltd., Clydebank, according to the remarks of the chairman, Sir Charles McLaren, at the annual meeting of the company in Sheffield, in order to place themselves in as favourable a position as their great rivals for taking orders for foreign warships, have been compelled to increase their capital. It was in this direction they were looking for the future prosperity of the Company. Although the orders on hand were large, they were really kept back by the difficulty of getting enough skilled labour. Last year they delivered eleven vessels. They had at present in hand the *Aquitania* for the Cunard line—the largest vessel ever laid down, and for which they had almost to reconstruct their shipyard, the *Australia*, the "Dreadnought" cruiser for the Commonwealth, the *Orama* for the Orient Line, two steamers for the Federal Line, the cruiser *Southampton*, three destroyers for the British Navy, a yacht, and the machinery for the *Queen Mary*, one of the largest of the new "Dreadnought" cruisers. He hoped the Admiralty would take a more generous view of the great armament works like their own. Shareholders put millions of money into these concerns in the belief that the Government departments would cordially support them, and it was a matter of great surprise to him to find that the Admiralty and the War Office rather took the credit for cutting down prices and getting work done for next to nothing, when they ought to feel that it was their duty to support them on fair terms and to give out orders fairly all round. The most recent order received by Messrs. Brown & Co. at Clydebank is for a powerful and splendidly equipped steam yacht for the Duke of Bedford, the order having been placed and the designs prepared by Messrs. G. L. Watson & Co., of Glasgow.

Messrs. Wm. Denny & Bros., Dumbarton, have received an order from Messrs. Cowans, Sheldon & Co., Carlisle, to build the boats for two 150-ton floating cranes, intended to be worked in conjunction with two "Dreadnought" floating docks at present being constructed. The cranes will be the largest of their kind in the world, and will each lift a working load of 150 tons at a radius of 90 ft. They will be tested with a load of 200 tons at that radius. The boats on which these cranes are to be erected will be 177 ft. long, 80 ft. beam, and have a draught of 14 ft. They will have twin screws, and with the weight of 150 tons on deck will have a speed of 7½ knots.

Messrs. Wm. Hamilton & Co., Port Glasgow, have received an order from Messrs. Grace Bros., London, to build an Isherwood type steamer of 8,000 tons.

The Greenock and Grangemouth Dockyard Co., Greenock, have received the contract for an oil-carrying steamer which the Anglo-American Oil Co. recently (as already recorded in these notes) placed with Messrs. D. J. Dunlop & Co., Port Glasgow, the recent loss of whose principal, Mr. David J. Dunlop, has necessitated the transfer.

The Clyde Shipbuilding and Engineering Co., Port Glasgow, have contracted to repair the extensive damage sustained by the Egyptian cruiser *Abd-el-Mouazu* through stranding on the Egyptian Mediterranean coast.

Messrs. G. L. Watson & Co., naval architects, Glasgow, have placed, along with larger contracts elsewhere noticed, one for a twin-screw motor yacht with Messrs. McGruer and Co., Clynder. Intended for a Clyde owner, she will be 56 ft. long and have steel frames and teak planking and deck. The interior fittings will be of walnut and mahogany. Her twin screws will be propelled by paraffin engines of 26 b.h.p., estimated to give the vessel a speed of nine knots.

Messrs. Hawthorn & Co., Ltd., and Messrs. S. & H. Morton and Co., Leith, both of which firms have carried on business at that port for over a century, have completed arrangements for the amalgamation of their concerns. The yards will continue to be occupied and staffed as at present.

The Caledon Shipbuilding Co., Dundee, have contracted to build two steamers for Messrs. Elder, Dempster & Co.,

Liverpool. The vessels will be 250 ft. in length, and are intended for the West African coasting trade.

Messrs. Mackay Bros., Alloa, have received an order, from South American owners, to build a 600-tons steamer.

Messrs. A. Jeffrey & Co., Alloa, have obtained a contract from London owners for two 500-ton barges.

Shipyard Purchase.—The Inch Shipbuilding Works, Port Glasgow, which until business about two months ago were carried on by Mr. D. J. Dunlop, have been conditionally purchased by Mr. Donald Bremner, until lately commercial partner in the Clyde Shipbuilding and Engineering Co., Ltd. Port Glasgow, and previously with the firm of Messrs. John Brown & Co., Ltd., Clydebank. The Inch works were established by Messrs. Cunliffe & Dunlop in 1871, and consist of shipyard, engineering shops, boilermaking and repairing works, and it is Mr. Bremner's intention to form a limited liability company to continue and develop the business in all its branches.

New Rolling Mill at Parkhead.—Messrs. Wm. Beardmore and Co., Parkhead Forge and Steel Works on June 26th started into regular work a new rolling mill for armour plates of the largest size, which is believed to be one of the largest in Great Britain. The firm have achieved considerable success in the manufacture of their own patent in armour plates, large contracts having recently been secured from the British Government. The width of plate which the new mill will be able to produce will be about 13 ft. 6 in., this meaning an addition of about three feet to the usual width of plate rolled by the ordinary mills. Some time ago the firm also completed a new smelting shop for the preparation of the heavy ingots required for guns and armour plates. The largest ingots run up to 90 tons required for the 13·5 guns. The new smelting department consists of six furnaces, four of which are capable of taking charges of 60 tons, the other two being of smaller capacity.

Shipyard Appointments.—Commander W. H. Wood, engineering works manager, and Mr. John Paterson, chief assistant to Mr. Luke, shipyard manager, have been appointed local directiors at the Clydebank works of Messrs. John Brown and Co., Ltd. Mr. W. R. G. Wilson, who for upwards of five years was yard manager to Messrs. Robert Duncan & Co., Port Glasgow, has been appointed to a similar position in the Hebburn-on-Tyne yard of Messrs. Palmer & Co., and took up his new duties at the end of July.

THE TEES AND HARTLEPOOLS.

(From our Own Correspondents.)

Messrs. Blair & Co. keep very busy with work on hand, they are reported to have secured several contracts for local steamers and some building on the Wear.

Whitby.

Messrs. Robinson's Steamship Co., Ltd., have recently sold the s.s. *Duke of York*, of 3181 gross tons, with engines 24 in., 39 in., 65 in. by 42 in. stroke to foreigners for about £25,000.

Middlesbrough.

Messrs. Sir Raylton Dixon & Co., Cleveland Dockyard, keep very busy having a good amount of work on hand, and it is rumoured they expect to secure an order for a large cargo steamer for Liverpool owners.

Messrs. W. Harkess & Co., Ltd., are very busy; they have just secured the contract to build two small steamers of about 215 ft. long for Messrs. Elder, Dempster & Co., Liverpool.

Messrs. Richardsons, Westgarth & Co. continue to be very busy. They are reported to have recently secured several orders for foreign account, both land and marine, besides being busy in their specialty department.

Messrs. Smith's Dry Dock Co., South Bank, continue very busy; they have also secured contracts to build and engine two small steamers of about 250 ft. long for Messrs. Elder, Dempster & Co., Liverpool.

The executors of the late J. W. Watson have recently sold the s.s. *Gertrude*, of about 325 tons deadweight, to British owners.

Trade in the district is considerably disorganized owing to sectional strikes in the various shipyards.

Stockton and Thornaby.

Messrs. Richardson, Duck & Co. continue to be fairly busy with work on hand; they are reported to have recently secured the order to build a medium sized cargo steamer.

Messrs. R. Ropner & Sons are fairly busy; they are reported to have secured the contracts to build two medium sized steamers for Messrs. Watts, Watts & Co., of London, so that they will now be busy for some months to come.

Messrs. Craig, Taylor & Co. report nothing new during the month, but are fairly busy and expect to secure an order for a cargo steamer reported as being in the market.

West Hartlepool.

Messrs. W. Gray & Co. continue to be very busy, launching a vessel nearly every week; they have recently secured the contract to build a cargo steamer of about 5,700 tons deadweight for Messrs. Glover Bros., London, also a cargo steamer for Messrs. Trechman, shipowners of this port.

Messrs. Irvine's Shipbuilding and Dry Dock Co., Harbour Dockyard, continue to be very busy and are reported to have secured the contract to build a small cargo steamer for foreign owners.

The Central Marine Engine Works of Messrs. W. Gray and Co. are very busy in all departments; they have secured the contracts to supply both engine and boilers for the several steamers to be built by their firm.

Messrs. Herskind & Co. have recently sold the s.s. *Iona*, of 2,050 gross tons, to Greek or Russian owners, for about £8,500.

Hartlepool.

Messrs. Irvine's Shipbuilding and Dry Dock Co., Middleton Yard, keep very busy in both the new work and repair departments. They are reported as having secured the contract to build a large cargo steamer for Liverpool owners.

Messrs. Richardsons, Westgarth & Co., Ltd., continue to be very busy. Besides the work on hand they are reported as having secured both contracts to supply the machinery for the cargo steamers to be built by Messrs. Irvine's Shipbuilding and Dry Dock Co. They also have several large condensing plant installations on hand, their system of "Contraflo" condensation giving great satisfaction.

THE HUMBER AND DISTRICT.

(From our Own Correspondent.)

THE shipping trade of the port is just now recovering itself after the prolonged strike of sailors, firemen and dockers. Owing to the action of the men in not discharging perishable cargoes many loads of fruit had to be taken to the Corporation destructor. At the time of writing the flour mills are still closed down.

At a meeting of the Humber Conservancy Board Works Committee, a letter was read from the Admiralty stating they contemplate the establishment of an oil fuel installation facing the river Humber, a short distance from Killingholme, extending riverward of the river lines, and a jetty about 500 ft. long, 10 ft. wide, with a T head 250 ft. long is to be provided.

C. Pickering, Esq., J.P., principal of the firm of Messrs. Pickering & Haddane, trawler owners, of Hull, has presented a park of 52 acres and has also had houses built on the estate at the entrance to the park, for old fishermen and widowed sailors. The park is beautifully laid out with lakes, rustic bridges, etc., and the gates at the entrance cost £1000.

Another shelter for the use of seamen and fishermen is about to be built on the south coast of Iceland. The scheme is well in hand, over £488 has been raised, and the construction will shortly be commenced. The need of these shelters is unfortunately only too well known to Hull fishermen; since 1898 about forty trawlers have been wrecked on the treacherous low lying coast, and seventy-seven lives lost. Though the natives are very hospitable and have given succour to many fishermen, who otherwise would have perished, many weary miles have to be tramped before habitations are reached, and oftentimes shipwrecked crews have undergone terrible privations.

Earles' Shipbuilding and Engineering Co., Ltd. The firm are keeping fairly busy with new and repairing work.

The latest addition to the Wilson Line fleet, R.M.S. *Bayardo*, underwent her trial trip on Saturday. She is a beautiful lined steamer with a cruiser's stern, which will, it is said, diminish vibration, and will be under the command of a well-tried servant in the person of Captain Soulsby, late of the R.M.S. *Aaro*, and the machinery is in charge of Mr. Woodhead, for many years chief engineer in the Wilson Line mail steamers.

Hull Central Dry Dock and Engineering Works, Ltd., have been fairly busy during the last month on the following steamers, s.s. *Tangermenude*, s.s. *Fredheim*, s.s. *Shad Thames*, s.s. *Emma*, in the Company's Graving dock, and have also had the Alexandra Graving Dock engaged. Several of above steamers have had extensive repairs, and opening out of boilers and machinery for Lloyd's survey. A number of other steamers have been under repair.

Goole Shipbuilding and Repairing Co., Ltd., have been very busy on repair work on several Goole steamers and others. They have been successful in booking a contract to build a steamer for Leith owners, 220 ft. long and with a speed of 12 knots, for a large powerful tug boat for the Wilson Line of Hull. Orders and a coasting steamer for North-east Coast owners have been booked. This yard has been very successful in securing orders for new steamers and repair work under the directorship of H. Craggs, Esq.

Messrs. Amos & Smith, Ltd., Engineers and Boilermakers, are working night and day to compete with their orders. Further orders for boilers and machinery for trawlers, etc., for delivery next year have been booked. The outside staff have not been quite so busy lately owing, no doubt, to the late strike. The steam hopper barge lately launched by the Blyth Shipbuilding and Dry Docks Co., Ltd., for the North-Eastern Railway Co. has had powerful machinery supplied by this firm.

Messrs. Woodall & Co., engineers and boilermakers, have been employed on the s.s. *Dunstad*, boiler repairs, etc., and the s.s. *Loma* has had extensive repairs carried out on deck and engine-room. The works are fully employed completing orders for their patent handiblocs.

Messrs. Cooper & Co., Ltd., engineers and boilermakers, Neptune Engine Works.—The pattern, moulding and boiler shops of this Company are fully employed and they have some very expensive repair work now going on in the docks on several steamers. The branch shop at Alexandra Dock and the graving dock in the old harbour, have been well booked up, and are still well employed. The public graving docks belonging to the railway companies have been engaged by the firm, to execute their work.

Messrs. C. D. Holmes & Co., engineers and boilermakers, are exceedingly busy building boilers and machinery for trawler owners for Grimsby and Hull, and their patent compound winches for trawlers. The branch shop at Alexandra Dock has also been kept busy.

North-East Coast Engineering Works, Ltd., have been working on the following steamers, in some cases requiring very extensive repairs—s.s. *Esperanza de Larrinaga*, s.s. *Tempus*, s.s. *Harmony*. The s.s. *Aridani* is now undergoing heavy repairs, *viz.*, new rudder, propeller and several plates in bottom have to be dealt with. This establishment is now in a position to contract for any heavy damage repairs and execute same with despatch, their machinery in their works is up-to-date and can handle any repair work.

Thomas Tate, engineer, boilermaker and ship smith, has had a fair month of repairs in foreign and coasting steamers, *viz.*, the Austrian steamer *Marina*, s.s. *Taffy*, s.s. *Flyda*, retubing boilers and several minor repairs on coasting and local tug boats.

Messrs. Cochrane & Sons, shipbuilders, Selby, are still contracting orders for coasting steamers, trawlers, drifters, but cannot guarantee delivery this year. Several of the departments are working overtime, to complete orders.

Messrs. Cook, Welton & Gemmell, Shipbuilders, Beverley, have launched four vessels this month. The yard is very busy and orders still come in.

Messrs. Stuart & Craig, engineers and boilermakers, have been fairly employed on the following steamers and sailing ships:—S.s. *Penlee*, s.s. *Gyda*, s.s. *Svea*, s.s. *Orlanda*, s.s. *Miranda*, tug *Stanley*. The above steamers have had engine-room and stokehold and some deck repairs. Sailing ships, *Gantocd Rock*, *Mezley*, *Queen Elizabeth*, *Charles Gounod*. Deck repairs, donkey boiler repairs and new water tanks, etc.

SOUTH OF ENGLAND AND ISLE OF WIGHT.

(*From our Own Correspondent.*)

Messrs. J. Samuel White & Co., Ltd., East Cowes, I. of W.—H.M.S. *Ferret*. Good progress has been made with work on this vessel, and it is expected that her official trials will be completed early this month. The vessel is a torpedo-boat destroyer, and the first vessel of last year's programme.

On the 8th of last month the Royal Motor Yacht Club held their regatta off Netley. The programme consisted of five races. The competing boats, several racing for the first time this year, included *Zigorella*, *Nigella*, *Sylvia* and *Maple Leaf III*. The first race was won by Mr. T. Thornycroft's cruiser *Shoveller*, the hydroplane *Sylvia* being second and *Nigella* third. The *Sylvia* won a handicap on the American tournament style, beating *Shoveller*, *Zigorella* and *Shrimper* in the order given. In a handicap for boats exceeding 10 knots *Meteorite* and *Rip* secured first and second prizes respectively. The weather conditions were ideal for racing, and the programme was one of the most interesting ever carried out by the club.

Southampton Harbour Board.—At the usual monthly meeting of the above held on the 18th of last month it was decided to accept provisionally the tender of Messrs. Henry Lovatt, Ltd., London and Wolverhampton, for the reconstruction of the Town Quay. The highest tender was £19,822, the lowest being Messrs. Lovatt's, which was £14,391. This tender was accepted subject to the detail drawings of the proposed reconstruction being approved by the Board's engineer.

Messrs. Day, Summers & Co., Ltd., Northam Ironworks, Southampton.—Last month this firm shipped two new boilers, which they have constructed for the s.y. *Capercailzie*, 772 tons, and s.y. *Sea Snake*, 108 tons respectively, and are now busy with a new boiler for the s.y. *Invincible*, 451 tons, to the order of the owner, Mr. Herbert Squiers, of New York. The s.y. *Alberta*, 1322 tons, which has been lying at her mud berth at the Company's yard for about eighteen months, has been sold by Messrs. Little & Johnston, and is now fitting out. The s.y.'s *Matador*, 233 tons, and s.y. *Latona* are fitting out, and the s.y. *Schievan*, 440 tons, has taken up a mud berth and will lie up. The firm have just received the order from the P. & O. Co. to convert their steamer *Somali* into a troop-ship for the approaching trooping season.

Repair Work.—Considerable repairs have been carried out on the Tilbury Dredging Co.'s dredger *Mercurius*, and also to one of the large hopper barges. The cable ship *Minia* and the United States training ship *Ranger* have also been under repair.

Messrs. J. I. Thornycroft & Co., Ltd., Southampton.—H.M.S. *Ariel*.—The boilers were shipped on board this vessel last month, and the deck closed up and riveted. The sister vessel, the *Acheron*, was launched on the 27th June, and the following particulars apply to both vessels. Both vessels are of a special type included in the 1910-11 programme, and built to the firm's design—Length b.p., 251 ft. 9 in.; beam, 26 ft. 4 in. The propelling machinery consists of a twin set of turbines of the Parsons type, designed to give a speed of 29 knots. Steam is supplied by three large water-tube boilers fired by oil fuel. The armament consists of two 4-in. and two 12-pounder guns, and there are two torpedo tubes.

ARMOURED MOTOR PATROL BOATS.—The first four of these boats have been under trial, and two have been shipped to their destination. Good progress is being made with the remainder. An order has just been booked for two twin-screw steam tugs for the Autofagasta & Bolivia Railway Co. The keel of the first boat is already laid, and the second will follow at an early date. Repair work.—A number of troopships have been in the firm's hands for refitting, and the repair department generally has been well occupied. The usual number of small jobs have gone through the shops.

New Development in Torpedo-Boat Design.—It is announced locally that the Admiralty have placed an important order with Messrs. J. I. Thornycroft & Co., Southampton, for a special type of torpedo boat, the propelling machinery of which will embrace internal combustion engines in combination with turbines. The internal combustion engines

will take the place of the reciprocating steam engines which have hitherto been employed in many instances for the duty of propulsion at cruising speeds. The turbine, as is well known, is not suited for this duty, owing to the great falling off in efficiency at the slower speeds of revolution when cruising. If this new departure be a success it will have a very far-reaching effect upon torpedo boat design.

The White Star Company.—The *Adriatic* after being dry docked, left Southampton for Liverpool last month, and in future Liverpool will be her home port. She has been displaced by the *Olympic*, and the service will be run by the three vessels, *viz.*, *Olympic*, *Majestic* and *Oceanic*. It is rumoured that the *Majestic* will follow the *Teutonic* in the Co.'s Canadian service after the arrival of the *Titanic*. The new sailing list prepared by the Company only allows the vessels three days in port at each end of the voyage, whereas previously a week was allowed.

THAMES.

(*From our Own Correspondent.*)

The Shipping Strike.—The outstanding feature of the past month has been the crisis in the shipping trade. Primarily the demand is for an increase in the dockers' wages of 2d. an hour to 8d. and 1s. per hour for overtime instead of 7d. Conferences have been held at the offices of the Port of London Authority, but the results are not satisfactory. Meanwhile at the Surrey Docks three hundred men actually came out, which at once showed itself in the shape of loss of business in the trade, ships being held up both outwards and inwards. As regards seamen and firemen concessions have been made. The Atlantic Transport Line, which consists of a large fleet and employs a numerous body of men, were enabled to adjust what difficulties they had very satisfactorily, the demand of the men for a representative to be present at the paying off of a ship being agreed to. Another company which was able to settle points of disagreement was the General Steam Navigation Co. As regards the dockers, the position of the Port of London Authority is that this body employs between 7000 and 8000 men, and therefore the Chairman, Lord Devonport, is presiding over the joint conferences which include shipowners, wharfingers, master lightermen and the National Transport Workers Federation. The employers have agreed to increase the 6d. rate to 7d. and overtime at 9d. as against 6d. It seems likely that on these general lines there may be hope of a settlement. In the meantime there are no actual men out, the dispute at the Surrey Docks being settled.

St. Paul's Bridge.—The question which has been in dispute for some time as to the line this new structure should take has been settled and the Corporation's original proposal agreed to. This means that instead of approaching the south of the Cathedral in the centre, the road will pass to the east of the building, and the bridge across the river will not be on the skew, which the alternative proposal would have caused it to be. On the whole the result seems satisfactory and it will be possible for the bridge to be built in masonry, whereas on the skew principle it is put forward that steel would have had to be used.

The Marine Society.—The anniversary meeting of this society has been held on board the *Warspite*, where there are now 246 lads in training. Among the company at this function was the president, the Earl of Romney, Admiral Sir N. Bowden-Smith, the Bishop of Rochester and the Hon. S. E. Marsham.

MERSEY AND MANCHESTER SHIP CANAL.

(*From our Own Correspondent.*)

CONSIDERABLE new work has been put into the water during the past month, both Admiralty and merchant tonnage. Enquiries have been fairly numerous, including some new destroyers work for the British Admiralty. The Mersey had quite a fleet of large steamers lying at anchor during the strike, which, fortunately for this port, was happily of short duration.

Messrs. Cammell, Laird & Co.—Work continues to be very brisk as in the departments of these works, the wet basin at present containing no less than five vessels fitting out. H.M.S *Adamant*, tender to submarine depot ship, was launched on June 12th. This is the first of a new type of vessel, and with her upper deck in will have a smart appearance. More than usual interest was manifest at this launch, due to the presence of the Colonial delegates. These vessels have clipper stems, long bridge and forecastle deck and have two masts. Their principal dimensions are: Length, 190 ft.; breadth, 32 ft. 6 in., and depth to upper deck, of 17 ft. Officers quarters are placed amidships, while there is an engineers' workshop aft of engine-room. A large electrical installation supplies power for the workshops, ship's lighting, searchlights, wireless telegraphy and charging the batteries on submarines. Triple-expansion engines are supplied with steam from two water-tube boilers, in separate stokeholds under the closed stokehold system, giving the vessels a speed of about 13 knots. On July 15th the Argentine destroyer *Tucuman* was launched, the christening ceremony being performed by Senora Trueba, the wife of the lieutenant-commander of the vessel. This is the fourth vessel of this type now building, the *San Luis*, *Santa Fe* and *Santiago* are now undergoing trials and outfitting. The British destroyers *Lapwing* and *Lizard* are nearing the launching stage, while the floating dock is showing its huge proportions above the mud dock in which it is being built. The powerful tug ordered by the Port of London Authority is now in frame, a number of shallow draught barges and lighters are ready for shipment abroad. The Norwegian steamer *Bucentaur* is still in dry dock, the whole of the tanks for carrying oil having been removed. The Isle of Man steamers, *Empress Queen* and *Prince of Wales* have also been in for repairs, etc.

Messrs. Clover, Clayton & Co.—The various dry docks belonging to this firm have been kept busy with a large range of work. The *Ravonia*, which ran on the rocks at St. Ives Head and was later beached for temporary repairs, was brought to Birkenhead and placed in dry dock and has had extensive repairs successfully carried out.

The Mersey Docks and Harbour Board.—The Liverpool City Council at their meeting on the 5th ult., passed a resolution conferring the freedom of the city upon Mr. Robert Gladstone, the late chairman of the Dock Board. Mr. Gladstone was elected a member of this body on Jan. 3rd, 1881, and was appointed chairman on 21st December, 1889, which position he held until the 26th January, 1911, during which time some £8,000,000 was spent on works.

The world-famous "Nimrod" left the Mersey on July 5th for Dudinsha, Siberia, on her business-pleasure cruise under the command of Captain T. Robinson. The owner, Captain V. Webster, intends studying the commercial needs of this part of Siberia, and to this end is taking out a special cargo of goods suitable for that part of Russia.

The "Olympic."—This vessel passed Plymouth on the 4th July on her return voyage, when she carried 2,275 passengers and beat her outward speed, making an average of 22 knots.

NORTH-WEST OF ENGLAND.

(*From our Own Correspondent.*)

Barrow-in-Furness.—July was an eventful month at Barrow in the sense that not only was a Chinese cruiser launched from the yard of Messrs. Vickers, Ltd., but that Admiral Togo paid a visit to Barrow, where his flagship the *Mikasa* was built, and where there is now under construction a Japanese battleship cruiser, which is larger than the same class of vessel, the *Princess Royal*, now being fitted up in the same yard for the British Admiralty. Barrow aroused itself to the importance of duly recognising Admiral Togo's visit, and not only was this naval hero well entertained by the firm, but by the Mayor of Barrow as well. The Admiral was accompanied by two Japanese cruisers the *Kasuga* and *Tone*. Barrow has already built two warships for Japan, and has another on the stocks, and has also built submarines and other naval features, and is now building engines for submarines which are being built in Japan. There is every prospect of further orders from Japan, and in Barrow there is a very large contingent of Japanese gentlemen who are

serving their apprenticeship with the Vickers' firm, or are inspecting the work which is being done for the Mikado's navy.

A Chinese Training Cruiser.—There was launched from the Barrow yard on the 14th July a training cruiser for China, and although this is only a comparatively small vessel, it is believed it will be the forerunner of other ships required for China's new navy. The principal dimensions of the ship just launched are: Length between perpendiculars, 320 ft.; breadth moulded, 23 ft. 9 in.; mean draught, 13 ft.; displacement about 2500 tons, speed about 20 knots. She has an armament of two 6-in. quick-firing guns, one carried on the forecastle deck and one on the poop deck; four 4-in. quick-firing guns placed on the upper deck, two at the aft end of the forecastle, and two at the fore end of the poop; two 14-pounder quick-firing guns, one on each end of the upper deck amidships; six 3-pounder quick-firing guns, three carried on each side of the upper deck in the waist and two 1¾-pounder quick-firing guns placed on the bridge. She is also fitted with two 18-in. revolving deck torpedo tubes, one on each side of the upper deck aft. The design has been made by the Vickers' firm with the view of enabling the ship to be instrumental in giving knowledge of the working of modern warships by the Chinese.

H.M.S. "Dartmouth."—The scout cruiser *Dartmouth* is now on her trials on the Clyde. It is expected she will prove an even greater success than H.M.S. *Liverpool*, built at Barrow, and that she will be one of the fastest vessels in the navy.

H.M.S. "Princess Royal."—The greatest possible activity is observable on this vessel, which is being fitted up in the Buccleuch Dock, Barrow. Her boilers and engines are being fixed, and the thousand and one incidentals of a great warship are being attended to by all the general trades employed. Efforts are being made to get her ready for her trials early next year, notwithstanding the delay occasioned by the boilermakers' lock-out. In this respect Messrs. Vickers, Ltd., are thoroughly well equipped with every up-to-date appliance to ensure celerity of production, and they have great resources at command which are being employed to ensure smart completion of the vessel.

The Montreal Floating Dock.—Quite an army of men are already employed in the construction of this dock, which has to be ready for delivery early next year, when the St. Lawrence is free from ice. The Vickers' firm are now delivering to the Canadian Government a powerful tug boat built at Barrow.

Premium Bonus and Overtime.—There is a movement among the engineers in this district to do away with premium bonus, but a majority of the men in Barrow are against it, and so are the masters, as they say they would have to double their workshop accommodation if the men returned to time work. The boilermen are also agitating against working overtime, but the majority of them are not in favour of any change.

Engineering.—The engineering shops are very busy and full of orders, and both in the marine and gun mounting departments great activity prevails and is likely to continue.

Hæmatites.—The hæmatite iron trade is very quiet, and the output has had to be reduced. Prices are lower at 63s. for makers' iron and 61s. 3d. for warrants cash.

Shipping.—Exports of iron and steel have fallen off considerably. There is a decrease of over 108,000 tons compared with the corresponding period of last year.

REVIEW.

Brix-Bootsbau. By Akademischer Verein Hütte and Wilhelm Ernst Sohn, Berlin. Price 9s.

This is a 4th edition of "Praktischer Schiffsbau Bootsbau", by the late A. Brix, formerly Privy Councillor to the German Admiralty. The book deals mainly with small craft and contains a general description of boats such as are used by the Navy, mercantile marine, yachts, lifeboats, pilot boats, and boats for communications, trading and sport. There are sections dealing with the designing, construction and building of boats, the machinery for equipping the same and maintenance. The book deals very exhaustively with the whole subject matter and has 328 illustrations.

LAUNCHES AND TRIAL TRIPS.

LAUNCHES English.

Stockport.—On May 15th, the last of the five steamers ordered from Earle's Shipbuilding and Engineering Co., Ltd., Hull, by the Great Central Railway Company, for quick passenger and cargo service between the ports of Grimsby and Hamburg was launched. The principal dimensions are: Length, 265 ft.; breadth, 36 ft. extreme; depth, 18 ft. 6 in. moulded. The vessel is constructed of steel, and has been built under special survey to Lloyd's 100 A1 class, Board of Trade latest rule, and in accordance with the German Emigration Laws, and the Hamburg Harbour Authorities requirements. She is of one-deck type, with poop, long bridge, and topgallant forecastle. There is ample accommodation for passengers—state-rooms for about 100 first-class are arranged in a commodious house on the bridge deck, with several four-berth cabins on the main deck. A special state-room of large dimensions, fitted up in luxurious style is provided on the main deck amidships. Rooms for about 10 second-class passengers are arranged under the poop. The third-class passengers, about 300 in number, will be berthed in fore and after 'tween decks. The arrangement and fittings of galleys, pantries, etc., are thoroughly up-to-date, and include all the latest improvements. The vessel is provided with all necessary cargo gear for rapid loading and discharge, and will be fitted with a special type of steam, hand, and telemotor steering gear. A complete installation of steam heating, electric lighting, bells and telephone will be fitted.

Kina.—On May 15th, there was launched from the Neptune Works of Messrs. Swan, Hunter and Wigham Richardson, Ltd., the *Kina*. The vessel is being constructed to the order of Det Ostasiatiske Kompagni, of Copenhagen, and is intended for their service between the Far East and Europe. She is 385 ft. in length by 53 ft. beam, and is designed to carry 8,200 tons deadweight. She is being constructed to attain the highest class in Lloyd's Register, and will be a cargo vessel of the highest class. Her auxiliary machinery is of the most modern and improved description, and there are very complete arrangements for working the vessel and for loading and discharging her cargo, including 12 steam winches and electric light. The propelling machinery consists of a set of triple expansion engines, supplied with steam by four single-ended boilers. Both engines and boilers are being constructed at the Neptune works.

Orangemoor.—On May 16th, Messrs. Wm. Doxford & Sons, Ltd., launched from their yard at Pallion, Sunderland, a turret deck steamer built to the order of Messrs. W. Runciman & Co., Newcastle. The dimensions are: Length, 366 ft.; breadth, 51 ft.; moulded depth, 26½ ft. The deadweight of 7,100 tons is carried on a moderate draft. Messrs. Doxford have supplied the engines and boilers. The classification is with Bureau Veritas.

Barrowmore.—On June 13th, Messrs. Richardson, Duck & Co. launched from their yard a finely modelled steel screw steamer of the following dimensions: Length overall, 375 ft.; breadth extreme, 50 ft.; depth moulded, 26 ft. 8 in.; gross tonnage about 3,730 tons. This vessel, which has been built to the order of Messrs. Wm. Johnston & Co., Ltd., of Liverpool, will take the highest class in British Corporation Registry, and has been built under special survey. She is of the single deck type, with a tier of main deck beams on which a sparred wood deck will be fitted. The erections are poop for cargo, bridge amidships with accommodation for captain, officers and engineers in houses on bridge deck, and topgallant forecastle for crew. A cellular double bottom throughout and peak tanks are fitted for water ballast, and equipment includes electric light throughout, six steam winches (five fitted with Wilson's patent chain drive), double derricks throughout, including two 12-ton derricks, derrick tables and cross-trees on masts, steam windlass with quick warping ends, stockless anchors, steam steering gear, etc., etc. The engines, by Messrs. Geo. Clark, Ltd., Sunderland, have cylinders 24 in., 40 in., 67 in. by 45 in. stroke, steam being supplied by two main and one auxiliary single-ended boilers, having a working pressure of 180 lbs. Messrs. Wailes, Dove & Co.'s Bitumastic Enamel was

applied to the bunkers, tank tops, bilge pumps, and the cellular double bottom, etc.

Isleworth.—On June 14th, Messrs. Raynes & Sons, Ltd., Stockton-on-Tees, launched from their building yard, a steel screw steamer of the following dimensions, viz.: Length, 293 ft., breadth, 42 ft., depth, 20 ft. 3 in. The vessel will be classed 100 A1 at Lloyd's, having main deck, poop, bridge and 1½ tonnage. A crew cabin for officers and engineers in houses on bridge deck, crew in forecastle and poop. The vessel has been built to the order of Messrs. The Britain Steamship Co., Ltd., London (Messrs. Watts, Watts & Co., Ltd., managers), under the supervision of Mr. W. V. Lang, of London. She will be fitted with double bottom for water ballast in the engine space, all fore and aft, and in fore and after peaks, and fully equipped with an up-to-date outfit, including quick warping steam windlass, stockless anchors, steam steering gear amidships and powerful screw gear aft, independent winch condenser, electric light, etc., etc. The appliances for loading and discharging cargoes expeditiously are very complete, and include seven steam winches, double derricks to each hatch, steam being supplied by a large donkey boiler working at 120 lbs. pressure per square inch. The engines will be of the triple expansion type, by Messrs. Blair & Co., Ltd., Stockton-on-Tees, of about 2,200 I.H.P., having two steel boilers 15 ft. 6 in. by 11 ft. 6 in., 180 lbs. steam pressure.

San Mateo.—On June 17th, Messrs. Wood, Skinner and Co., Ltd., successfully launched from their shipyard at Bill Quay-on-Tyne, a steel screw steamer which has been built by them to the order of Mr. Otto Thoresen, of Christiania. The vessel is a sister ship to the *Sao Nicolau*, recently constructed by the builders for the same owner. She has two complete steel decks, the upper one being sheathed with wood. Water ballast is provided in the cellular double bottom all fore and aft and in after peak tank. The vessel will be specially fitted with all the most modern arrangements for fruit carrying for which trade she is intended. The propelling machinery has been constructed and will be fitted by Messrs. The North Eastern Marine Engineering Co., Ltd., of Wallsend-on-Tyne, and is of the latest improved triple expansion type, supplied with steam by three large multitubular boilers working at a high pressure under forced draft. Both the ship and the engines have been constructed to the requirements and under the special survey of Det Norske Veritas for their highest classification. When completed the *San Mateo* will be commanded by Captain Berbom, of Christiania.

Chenab.—At Birkenhead there has been launched a new steamer for Messrs. James Nourse, Ltd., of Liverpool and London. The vessel, which was named *Chenab*, has been specially designed and constructed for the carriage of coolies beween Calcutta and the West Indies. Her 'tween decks run unbroken right fore and aft. On the main deck specially prepared houses have been erected, and these will be fitted up as a hospital and dispensary for the medical treatment of the coolies. The *Chenab* is a vessel of 3,005 tons gross, 2,200 tons nett, and 5,000 tons deadweight carrying capacity.

Yorkton.—There has recently been launched at Sunderland a single-decked steamer, which has been specially built for the Canadian Lake service, and which is to take the highest class in British Corporation for this trade. The leading dimensions are: Length b.p., 250 ft.; breadth, 42 ft. 6 in.; and depth, 18 ft. 6 in. Deck-houses are placed aft over machinery, with sun deck above, and over the topgallant forecastle is fitted a Texas house. The vessel is fitted with clear holds for the carrying of grain in bulk, and is built with deep cantilever frames in order to dispense with pillars. The main engines are by the North Eastern Marine Engineering Co., Ltd., Sunderland, and have cylinders 17, 28, and 46 in. in diameter, by 33 in. stroke, steam being supplied by two large boilers working at a pressure of 185 lb. per square inch. The vessel has been constructed to the order of Messrs. J. & J. T. Matthews, of Toronto, Canada.

Minster.—On June 27th, there was launched from the shipbuilding and repairing yard of Messrs. S. P. Austin & Son, Ltd., the steel screw steamer *Minster*, classed 100 A1 Lloyd's Register under special survey, built to the order of Messrs. Stephenson Clarke & Co., of London, and being the seventh vessel constructed by them for the same owners. She is designed to carry about 4,000 tons on a light draught of water, and is specially adapted for the wood trade, including large water ballast capacity so that the vessel can make good passage in all kinds of weather. The machinery will be supplied by the North Eastern Marine Engineering Co., Ltd., the deck machinery, comprising seven steam winches and steam windlass, by Clarke, Chapman & Co., Ltd.; steam steering gear by Donkin and Co., and steam will be supplied for these from a Cochran (Annan) multitubular donkey boiler, fitted with patent stainless furnace.

Armora.—On June 27th, Messrs. Osbourne, Graham and Co., launched from their yard at Hylton the steel screw steamer *Armora*, which they have specially constructed to the order of Messrs. Fletcher Wrightson & Co., of Manchester. She is a single decker, 290 ft. by 40 ft. 1½ in., by 20 ft. 8 in. moulded, with poop, long bridge and forecastle. Built to carry about 3,300 tons on a shallow draught, she takes Lloyd's highest class and has deep bulb angle framing, absolutely clear holds, large hatchways capable of enabling the largest class of machinery to be shipped and discharged in a prompt manner. The vessel is fitted with the most modern appliances for economical and quick working of cargo, and has an ample outfit of derricks and winches capable of lifting 10 tons. Water ballast is throughout double bottom and in both peaks. After the launch the vessel proceeded direct to the works of the N.E. Marine Engineering Co., Ltd., at Sunderland, to receive her machinery, which has cylinders 21 in., 34 in., 56 in., by 36 in., with two large boilers driven at 180 lbs. pressure.

Siamese Prince.—On June 28th, the *Siamese Prince*, built to the order of Mr. James Knott for the Prince Line Limited, was launched from the yard of the Sunderland Shipbuilding Co., Ltd. The leading dimensions are: Length, 410 ft.; breadth, 54 ft. 4 in.; and depth moulded 28 ft. 1 in. She is classed 100 A1 Lloyd's, and has a complete shelter deck, with 'tween decks below running right fore and aft. The ordinary quarter pillars have been dispensed with by an arrangement of tubular pillars widely spaced. Ample provision is made for water ballast in cellular double bottom, both peaks, and also in deep tank at after end of machinery space. The loading and discharging facilities are of a special character, 16 derricks being fitted on mast tables and four on derrick posts for the purpose of working the six hatches, and a 30-ton derrick is also provided to work from either mast. The deck machinery consists of 12 steam winches, steam steering gear fitted up at after end of engine room, and direct steam windlass, the whole being worked by a large horizontal donkey boiler situated inside the casing. A hand steering gear is fitted in deck-house aft. Accommodation is provided on top of shelter deck amidships for 12 passengers, together with captain, officers and engineers, whilst a commodious saloon is tastefully fitted up in polished hardwoods. The crew and petty officers are situated under shelter deck aft. A room for carrying mails and specie is fitted up in a large store room underneath shelter deck amidships. A complete installation of electric light is fitted throughout the vessel, and the accommodation is provided with steam heating and an efficient sanitary service. The main engines are by the North-Eastern Marine Engineering Co., Ltd., Sunderland, and have cylinders 27 in., 45 in., and 74 in. by 51 in. stroke, steam being supplied by three large boilers working at a pressure of 180 lbs. per square inch, which are fitted with Howden's forced draught arrangements. Messrs. Wailes, Dove and Co.'s Bitumastic Enamel has been applied to bunkers, etc.

Faci, Meknassi, Marakchi, & Lord Salisbury.—On June 28 and 29th, there were launched from the yard of Messrs. Cochrane & Sons, Selby, three steel screw steamers for French owners and one steel screw steamer for Hull owners. The vessels will be replete with all the latest improvements for the trade for which they are intended, and will be fitted with powerful triple expansion engines by Messrs. Amos & Smith, Ltd., and Messrs. C. D. Holmes & Co., Ltd., of Hull.

LAUNCHES—Scotch.

Den of Airlie.—On June 27th, there was launched at Port Glasgow a large steamer named *Den of Airlie* for

Messrs. Charles Parrie & Son, Dundee. Her dimensions are: Length, 150 ft. over all; breadth, 54 ft. 2 in.; moulded depth, 28 ft. 2 in.; with a gross tonnage of 5,250. She has been fitted for a limited number of passengers, and will have a shelter deck. Messrs. Wailes, Dove and Co.'s Bituminous Covering has been applied to tank tops in engine and boiler rooms, and their Bitumastic Enamel to bunkers, etc.

Clan Macnaughton.—On June 28th, Messrs. Alex. Stephen & Sons, Ltd., launched a large finely modelled screw steamer for the Clan Line. She has been constructed to British Corporation requirements, her dimensions being: Length, 480 ft.; breadth, 53 ft. 3 in.; depth, 37 ft. to shelter deck. Designed for the Eastern trade, she has a full equipment of derricks, including one of 40 tons, and also a number of powerful winches to facilitate the handling of heavy cargo. Besides having a cellular double bottom, the vessel has a deep tank amidships capable of carrying 1,600 tons water ballast. A complete installation of electric light has been fitted, also Bow, McLachlan's steam steering gear amidships and a hand gear aft, fitted with Lyall's patent brake. The machinery, which has also been supplied by the builders, consists of a set of triple expansion engines, having cylinders 29 in., 49 in. and 80 in. diameter, with a stroke of 60 in., and supplied with steam from three large single-ended boilers fitted with Howden's forced draught. Messrs. Wailes, Dove & Co.'s Bitumastic Enamel has been applied to bunkers, etc.

Halifax.—On June 20th, there was launched from the yard of Messrs. Napier & Miller, Ltd., Old Kilpatrick, the double screw ferry steamer *Halifax,* built to the order of the Dartmouth Ferry Commissioners, Dartmouth, Nova Scotia. The dimensions of the vessel are: Length, 125 ft.; breadth, 48 ft.; depth, 13 ft. 1 in.; with a gross tonnage of about 600 tons, built under the rules of Lloyd's Register for their highest class. The vessel has a complete main deck with promenade and awning decks above, three watertight bulkheads, and has been specially built for ferry service between Dartmouth and Halifax. Accommodation for passengers is arranged in large deck houses on each side of main deck, with a driveway in the centre of ship for wagons and teams. The vessel has been fitted with electric light throughout. Machinery is being supplied by Messrs. Aitchison Blair, Ltd., Clydebank, and consists of two sets of compound engines and two navy boilers.

Orama.—The *Orama,* the latest addition to the fleet of fine mail and passenger vessels owned by the Orient Line was launched at Clydebank on June 27th, by Messrs. John Brown & Co., Limited. The *Orama* is the sixth liner built for the Orient Line within the past three years. The leading particulars of the *Orama* as compared with the *Orsova,* which was launched at Clydebank in 1909, are as follows: *Orama*—Length over all, 569 ft.; length b.p., 550 ft.; extreme breadth, 64 ft.; depth from shelter deck, 42 ft.; depth from chart-house, 84 ft.; gross tonnage, 13,000 tons; speed, 18 knots. *Orsova*—Length over all, 553 ft.; length b.p., 535 ft.; extreme breadth, 63 ft. 3 in.; depth from shelter deck, 46 ft.; depth from chart-house, 80 ft. 9 in.; gross tonnage, 12,036 tons; speed, 18 knots. Accommodation is provided for about 450 first and second-class passengers, and over 630 third-class. The owners have planned the vessel so that there will be a large number of berths on the promenade, bridge, shelter, and upper decks. The rooms will be large and airy, so as to be suitable for the Australian trade. On the after end of the promenade deck there will be a first-class smoke-room and verandah lounge. Forward of this there will be a range of one-berth first-class state rooms, and at the forward end there will be the lounge and writing-room. The after bridge deck will be used as a third-class promenade space, and the central bridge deck will be divided between the first and second-class. On the after end of this deck the second-class smoke-room and music-room will be situated, while immediately below, on the shelter deck, there will be a good-sized third-class smoke-room and music-room. The first and second-class dining saloons, for 188 and 178 passengers respectively, will be on the upper deck. Three holds and one 'tween deck space forward have been insulated for perishable cargoes. The hull has been built throughout in conformity to Lloyd's highest class, and is sub-divided by 10 watertight bulkheads. The propelling machinery will drive triple screws, and will consist of a combination of reciprocating engines and turbines. The *Orama* will have two independent sets of four-crank inverted, reciprocating, triple expansion balanced engines working in conjunction with a low pressure turbine. The cylinders will be of 27½ in. and 42 in., and two at 47 in. diameter respectively, with a stroke of 54 in. Steam will be supplied by two double-ended and five single-ended cylindrical boilers worked under forced draught, and constructed for a working pressure of 215 lbs. The boilers will be arranged in two boiler rooms between watertight bulkheads, and with coal bunkers at either side.

Wollongbar. Messrs. The Ailsa Shipbuilding Co., Troon, launched the twin screw steamer *Wollongbar,* on June 30th. The vessel is for the North Coast Steam Navigation Co., Sydney, N.S.W., and a distinguished party of Australians was present at the launch, including the Right Hon. Andrew Fisher, Premier of Australia, the naming ceremony being performed by Mrs. Fisher. The vessel, which is the largest ever built by the Ailsa Co., and the largest in the service of the owners, is 285 ft. long b.p., 40 ft. broad, 25 ft. deep to awning deck, and was designed by Mr. Charles McAllister, the company's marine superintendent. She is classed with the British Corporation Registry for passenger costal trade, and has accommodation for about 300 passengers. The machinery, being supplied by the builders, consists of two sets of triple expansion, balanced engines, with four cylinders, 29 in., 48 in., 56 in., and 56 in. diameter respectively, and a 39 in. stroke, capable of giving a speed of 18 knots. The Marquis of Ailsa, in proposing "The North Coast Steam Navigation Co.," traced the history of the Ailsa Shipbuilding Co. from its inception by one of the Dukes of Portland almost a century ago, and pointed out that formerly in wooden shipbuilding and latterly in iron, the company had an honourable place in Clyde seafaring annals. Mr. Hendry, of Paton & Hendry, Glasgow, agents in this country of The North Coast Steam Navigation Co., suitably replied for the owners.

LAUNCH—Irish.

Chelohsin.—On June 29th, there was launched at Dublin a twin-screw passenger steamer for the Union Steamship Company of Vancouver. Her dimensions are 175 ft. between perpendiculars by 35 ft. moulded breadth by 22 ft. 6 in. to the awning deck. The vessel is fitted with electric light, searchlight, steam heating, electric fans, and all modern appliances for the comfort of passengers, and to meet the special requirements for service in the waters of British Columbia. The machinery will be supplied from Belfast, and will consist of two sets of triple expansion engines of about 1,500 horse power, and capable of driving the vessel in her loaded condition at a speed of 14 knots.

Zealandic.—On June 29th, the twin screw steamer *Zealandic* was successfully launched at Belfast by Harland and Wolff, Ltd. The new vessel, which has been built for the White Star Line, for the Australian and New Zealand service, is 477 ft. long by 62 ft. 9 in. beam, and about 8,000 tons gross register, and has been specially designed for the trade. She will have very large cargo capacity in six holds—two for general cargo and four holds insulated for carrying frozen cargo. The deck machinery and appliances for working ship and cargo are of the most complete and approved type, there being in addition to the steam windlass, 19 steam winches and 21 derricks. The steering gear is of Harland & Wolff's well known make, and is capable of being worked by telemotor from the flying bridge. The refrigerating machinery is placed at the after end of the engine room. The vessel is lighted throughout with electric light, and is fitted with electric bells in saloon, state-rooms, captain's room, smoke-room, and chart-room. There will be accommodation for a number of first-class passengers, with a comfortable saloon, smoke-room and state-rooms; and a feature of the ship will be the accommodation specially arranged for over 1,100 third-class passengers in enclosed rooms, with space on shelter deck arranged for third-class

smoke-room and dining room, and also a third-class ladies' room, a provision that will doubtless be much appreciated. The propelling machinery consists of two sets of quadruple expansion engines on the "balanced" principle. Messrs. Wailes, Dove & Co.'s Bitumastic Coating has been applied to holds, tank tops, etc.

TRIAL TRIPS.

Kina. On June 16th, the new steamer *Kina* sailed from the Tyne on the conclusion of a very satisfactory trial trip. The steamer has been built and engined at the Neptune Works of Messrs. Swan, Hunter & Wigham Richardson, Ltd., to the order of Det Ostasiatiske Kompagni, of Copenhagen, and is intended for their line between Europe and the Far East. She is of the shelter deck type, 388 ft. in length, by 53 ft. beam, and will carry over 8,500 tons deadweight. She has been constructed to attain the highest class of Lloyd's Register, and is in every way a superior cargo steamer of the most modern type. The propelling machinery consists of a set of triple expansion engines, supplied with steam by four single-ended boilers, all constructed at the Neptune Works. On the trial trip everything worked without a hitch, giving satisfaction to all concerned, and propelling the vessel at a speed of nearly 13 knots. The owners were represented on the trial trip by their superintendent engineer, Mr. Wittrup, whilst the builders were represented by their director, Mr. G. F. Tweedy.

Orangemoor. On June 17th, the turret deck steamer *Orangemoor*, built and engined by Messrs. Wm. Doxford and Sons, Ltd., Sunderland, to the order of the Moor Line, Ltd. (Messrs. W. Runciman & Co.), Newcastle, ran a successful trial. The *Orangemoor* is 360 ft. long, 50 ft. broad, and of 26 ft. moulded depth, carrying 7,200 tons deadweight on a moderate draught.

Birchfield. On June 17th, this large and finely modelled vessel just completed by Messrs. Joseph L. Thompson and Sons, Ltd., at the North Sands Shipbuilding Yard, Sunderland, was taken on her official trial trip. The trial was most successful in every way, everything working smoothly and giving the utmost satisfaction. The owners were represented by their superintendent, Mr. J. Rogers, under whose personal supervision the ship and engines have been constructed; and the engine builders, Messrs. John Dickinson & Sons, Ltd., by Mr. J. A. Bowden. See Launches, June.

Oreland. On June 17th, the steel screw steamer *Oreland*, built by The Northumberland Shipbuilding Co., Ltd., Howdon-on-Tyne, to the order of Messrs. Nelson Trading, Limited (Fred Drughorn, Ltd., London managers), left the Tyne for her official trial trip. The trial trip proved in every way satisfactory, and a speed of 11 knots was obtained. See Launches, June.

Harpalyce. On June 21st, this handsome steel screw steamer, built by Messrs. William Gray & Co., Ltd., to the order of Messrs. J. & C. Harrison, Ltd., of London, had her trial trip. A speed of 13 knots was attained, the engines running smoothly and well, and the performance of ship being entirely satisfactory. The vessel afterwards proceeded to Cardiff to load. See Launches, July.

Mary Baird. On June 24th, the steel screw steamer *Mary Baird*, built by Messrs. Craig, Taylor & Co., Ltd., Stockton-on-Tees, to the order of Messrs. J. W. Baird and Co., for the Baird Shipping Co., Ltd., West Hartlepool, was taken to sea for her trial trip, which proved highly satisfactory. During the whole of the run everything worked with the greatest smoothness, and over a course of nine miles a speed of 11¼ knots was attained. The owners expressed themselves as being very highly pleased with the ship and engines. Immediately after the trial, the vessel proceeded to West Hartlepool under command of Captain G. H. Boulberger. See Launches, July.

Henrik. On July 5th, the new steamer *Henrik*, built by Sir Raylton Dixon & Co., Ltd., at their Cleveland Dockyard, Middlesbrough, to the order of Messrs. Brugsgaard, Kiosterud & Co., of Drammen, Norway, proceeded to sea for her official trials. The trials proved in every way successful, and the vessel, under the command of Captain T. K. Simonsen, proceeded direct to Blyth. See Launches, July.

BOARD OF TRADE EXAMINATIONS.

[illegible]

May 4th.—Pearson, T. A. — Ex 1C [illegible]
[illegible] le, J. — Ex 1C [illegible]
[illegible] A. J. — Ex 1C Glasgow
[illegible] W. J. — Ex 1C N. Shields
[illegible] M. Donald, W. — Ex 1C London
[illegible] H. — Ex 1C [illegible]
[illegible] B. — Ex 1C London

Note: 1C denotes First Class: 2C Second Class.

April [illegible]

Agar, J. A. .. 1C [illegible]
Alexander, W. S. .. 2C Glasgow
Allard, S. F. .. 2C London
Allen, J. ..... 2C South'ton
Anderson, J. .. 2C Glasgow
Bragg, J. ..... 1C Liverpool
Carden, J. H. .. 1C [illegible]
Carter, J. ..... 1C N. Shields
Cormack, G. .. 2C Glasgow
Cossar, J. ..... 2C Glasgow
Crozier, C. H. .. 2C W. Hart'l
Davis, G. W. .. 2C N. Shields
Doyle, W. H. .. 2C W. Hart'l
Eggert, J. ..... 2C N. Shields
Fax, C. J. ..... 2C Cardiff
Farnecox, W. R. 1C London
Gillett, A. C. .. 1C Cardiff
Glenne, J. ..... 1C Liverpool
Goodall, J. .. .. 2C Cardiff
Grainger, T. .. 2C W. Hart'l
Greig, R. L. .. 2C Leith
Hamer, H. ... .. 2C W. Hart'l
Jones, D. M. .. 1C Cardiff
Kay, H. S. .... 2C Liverpool
McLeod, W. .. 2C Leith
Markham, A. .. 2C N. Shields
Marks, T. .... 1C Cardiff
Nelson, H. .... 2C Liverpool
Oliver, T. W. .. 2C N. Shields
Park, H. ..... 1C N. Shields
Peter, J. S. .... 2C Liverpool
Quigley, R. .... 1C Glasgow
Rappa, E. C. .. 1C Glasgow
Rodhouse, A. J. 2C Liverpool
Reed, A. H. .. 2C Liverpool
Ronthwaite, H. 1C London
Rutter, W. J. .. 1C London
Slater, C. W. .. 1C N. Shields
Todd, D. .... 1C Liverpool
Waddell, L. P. 2C London
Ward, A. ..... 2C South'ton
Watson, E. A. .. 1C Leith
Watson, P. R. .. 2C Glasgow
Watt, A. ..... 1C N. Shields
Wignall, W. .. 2C Liverpool
Wilson, T. H. .. 2C Leith
Yates, G. ..... 1C Cardiff

April [illegible]

Armstrong, G. .. 2C Aberdeen
Auld, C. A. .... 2C Aberdeen
Barron, G. .... 2C Sunderl'd
Bowman, H. .. 1C London
Brown, E. .... 2C Sunderl'd
Carster, J. ... 2C Liverpool
Dougan, W. .. 2C Liverpool
Dorman, J. H. 1C London
Gilbertson, P. D. 2C Liverpool
Hardy, T. .. 2C [illegible]
Henderson, D. .. 2C [illegible]
Hume, W. A. .. 2C [illegible]
Lowe, [illegible] 2C [illegible]
Mackenzie, W. 2C [illegible]
McIlwain, J. .. 2C [illegible]
McKelvey, G. W. 2C [illegible]
McKenzie, M. .. 2C [illegible]
McKersie, J. .. 1C Londn'ry
McWhirter, G. 2C Liverpool
Moore, A. ... 2C Hull
Noble, J. .. .. 2C Aberdeen
O'Neill, J. .. 2C Greenock
Phillips, J. E. .. 2C Liverpool
Robertson, A. .. 2C Aberdeen
Rodger, R. C. .. 2C Aberdeen
Scorgie, G. C. 1C Greenock
Smith, H. ... .. 1C Aberdeen
Taylor, W. .. .. 1C Sunderl'd
Vergo, F. C. .. 2C London
Wauste, J. B. .. 2C Greenock

May 4th.

Ansell, C. N. .. 1C London
Atwood, S. C. 2C Cardiff
Bateson, C. E. 2C South'ton
Bird, J. ..... 2C N. Shields
Boalch, H. .. .. 2C Cardiff
Brawley, W. .. 1C Cardiff
Campbell, J. .. 2C Glasgow
Canning, J. .. 2C N. Shields
Davies, D. J. .. 2C Liverpool
Davies, J. W. .. 2C Liverpool
English, A. E. 2C Cardiff
Galbraith, J. A. 1C Glasgow
Greig, W. .... 2C Leith
Hay, A. ..... 1C Glasgow
Heppel, T. D. .. 1C London
Jones, L. F. .. 1C London
Jones, W. J. .. 1C Cardiff
Kelly, T. S. .... 2C Cardiff
Lacy, W. A. .. 2C Cardiff
McLachlan, R. 2C Liverpool
Mead, F. .. .. 2C N. Shields
Moore, C. A. .. 2C N. Shields
Morgan, F. ... 1C N. Shields
Nelson, M. T. 2C N. Shields
Nicol, J. L. .... 1C Glasgow
O'Donovan, G. 1C Liverpool
O'Keeffe, W. .. 1C South'ton
Orchard, G. A. 1C Leith
Patterson, E. H. 2C Cardiff
Payson, H. C. . 1C South'ton
Ram, A. R. .... 2C London
Rigby, W. J. .. 2C Liverpool
Rowe, W. G. .. 1C Liverpool
Simpson, R. A. 1C Glasgow
Scott, J. M. .... 2C Glasgow
Scott, M. .... 1C Leith
Smith, A. J. .. 1C London
Steuart, T. .... 2C [illegible]
Stoddart, G. .. 1C N. Shields
Warwick, G. .. 1C N. Shields
Williams, H. B. 1C [illegible]
Williamson, W. 2C Liverpool
Williams, R. .. 1C Cardiff
Williamson, S. 2C London

May [illegible]

Avery, A. .... 2C Greenock
Armstrong, J. .. 2C N. Shields
Atwood, J. .. 1C N. Shields
[illegible] 1C [illegible]
[illegible] 1C [illegible]
[illegible] 1C N. Shields
Cook, H. 2C Hull
Evans, S. .. 1C Liverpool
Galloway, C. W. 2C [illegible]
Greenaway, W. 1C Liverpool

Hamilton, J. M.	2C	London
Hesser, A. M.	2C	London
Hoffmann, F.	1C	Liverpool
Isaacs, A.	1C	Liverpool
Jones, D.	1C	N. Shields
Lulham, W.	2C	Liverpool
Lynn, V.	1C	Liverpool
McKee, A.	2C	Greenock
McPhee, J.	2C	Greenock
Mitchell, W.	2C	Barrow
Morton, J.	2C	N. Shields
Nash, A.	2C	N. Shields
Phelps, R. J.	2C	Dublin
Roper, W.	1C	N. Shields
Sanderson, R.	2C	N. Shields
Snowden, J. B.	2C	London
Stenhouse, D.	2C	N. Shields
Warren, G.	1C	Liverpool
Williams, A.	2C	Liverpool

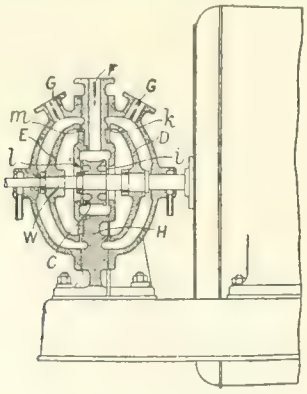
May 18th

Aitken, C.	2C	South'ton
Burn, W.	1C	N. Shields
Caley, F.	2C	Liverpool
Cameron, J.	2C	London
Chatterton, H.	2C	Liverpool
Cummings, L.	2C	W. Hart'l
Dagg, W.	1C	N. Shields
Dishington, J. G.	1C	Glasgow
Douglas, A.	1C	London
Fraser, I.	2C	Liverpool
Lyall, F.	2C	London
Hamilton, R.	2C	Cardiff
Harrow, W.	1C	Glasgow
Henderson, T.	1C	Glasgow
Holthusen, L.	2C	London
Howard, G.	2C	W. Hart'l
Innes, J.	2C	Glasgow
Jeune, F.	2C	N. Shields
Lumsden, D.	1C	Leith
McKay, C.	2C	N. Shields
Moloney, J. E.	1C	London
Oxberry, J.	2C	N. Shields
Pearson, B.	2C	N. Shields
Petrie, C.	2C	W. Hart'l
Prydie, J.	2C	Glasgow
Ridley, J.	1C	Glasgow
Service, J.	2C	Cardiff
Smith, A.	2C	Cardiff
Stalker, E.	1C	N. Shields
Stevenson, W.	2C	Leith
Thompson, A.	1C	W. Hart'l
Turner, J.	2C	South'ton
Watts, F.	2C	Liverpool
Winfield, J.	2C	South'ton
Young, W.	1C	Glasgow

The Marine Engineer and Naval Architect Patent Record.

Compiled by Messrs. E. P. Alexander & Son, Chartered Patent Agents, 306, High Holborn, London, W.C.

5487. Thrust Bearings. End-thrust in both directions on shafts of turbines, centrifugal pumps, dynamos, ships' propellers and other machines is relieved by discs for each direction of thrust, acted upon by fluid under pressure, arranged on the shaft so as to increase or decrease the thrust on the discs automatically by the axial movements of the shaft. Discs D, E on the spindle W are acted on by fluid supplied to the pipe F, which passes through passages between the fixed partition H and the cylinder C fixed on the shaft.



As the shaft moves axially by unbalanced end thrusts, the passages *i*, *l* are opened and closed, and fluid enters the chambers bounded by the discs D, E more or less freely. At the same time, the passages *k*, *m* are closed or opened and allow the fluid to escape to the pipes G, and thus the axial pressure on the disc D is increased and that on disc E is decreased if the shaft moves to the left and a thrust in the reverse direction is balanced by increased pressure on the disc E.

6127. Ships. *Power, obtaining from ship's way.*—In plant for obtaining auxiliary power from the motion of a ship, a bell-mouthed pipe *d* at the bow opens into branch pipes *h* in which are turbines *a* backed by thrust bearings *c*. The turbines are arranged to drive dynamos *b*, the waste water passing to a tank *z* which supplies the circulating water

FIG 1.

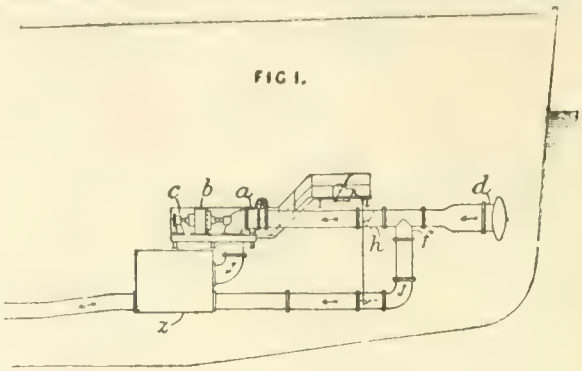
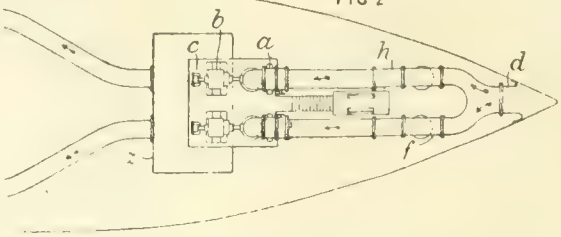
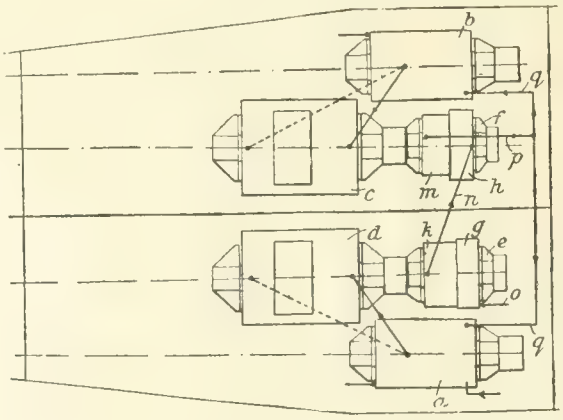


FIG 2



for the condensers. Each of the pipes *h* is fitted with a controlling valve and a by-pass *f*, also fitted with a valve, leading directly to the tank *z*.

6646. Turbines.—In marine turbine installations, the steam passes through one or more impulse stages followed by a reaction section, whence the fluid passes through further impulse stages before delivery to the lower pressure reaction section or sections. A four-shaft installation comprises high-pressure turbines *a*, *b*, low-pressure turbines *c*, *d*, and cruising-turbines *e*, *f*, the latter consisting of impulse sections *g*, *h*, and reaction sections *k*, *m*. The turbines *a*, *b* may also be provided with impulse stages followed by a reaction section. Under cruising conditions, steam is supplied from a pipe *o* to the turbine *e*, and afterwards flows by a pipe *n* to the turbine *f*, in each case passing through both impulse



and reaction sections. On delivery from the turbine *f*, the steam is passed in any desired manner through the remaining turbines. In the example shown, it passes through a pipe *p* to a branch pipe *q*, whence it is delivered to the port and starboard sets in parallel. When the turbines *a*, *b* are provided with impulse stages, arrangements may be made for admitting live steam to the turbines *e*, *f* in parallel when required. In cases where an impulse section receives live and exhaust steam alternately, or both simultaneously, double sets of inlet nozzles are provided. For high speeds, steam is admitted direct to the turbines *a*, *b*, the turbines *e*, *f* running idle.

The Marine Engineer

And Naval Architect.

LONDON, SEPTEMBER, 1911.

NAVAL ENGINEERS

THE present trend of education, relatively to naval and engineer officers in the navies of Great Britain and the United States of America, is receiving attention from other countries than those domestically interested therein. We note that in an article on "Naval Engineers" in the naval annual, "Jane's Fighting Ships," written by the well-known writer on naval matters, Mr. Charles de Grave Sells, the question of the "universal type" of naval engineer is again discussed, and the views of the Italian Naval Authorities are set out. A special commission was appointed by the Italian Minister of Marine to consider and report upon the matter, and the conclusion arrived at by this tribunal is well worthy of serious attention. It was unanimously agreed that the entry into the navy and the earlier training of naval officers and engineer officers ought to be uniform for both, but the feasibility or desirability of the "universal type" of officer was decided in the negative. It is pointed out that a change of such a radical nature should not be made unless absolutely indispensable in the interests of the service, and this cannot be shown to be the case, for the experience of using machinery for over fifty years past has certainly shown evidence that the difficulties in the service are such as not to justify any such change. The nature of each class of officer is clearly defined from which the conclusion as to the efficient performance of duties is deduced. It is pointed out that the chief engineer's duties are executive, requiring great capacity and technical ability; he must be a thorough specialist in the working of the engines and all relating to them, and one in whom the commander can place the greatest reliance. Such specialization can only be attained in the most complete manner by avoiding the unnecessary military nautical studies. Comparing these duties with those of the commander of a vessel it will be found that of the latter there is one of a very specialized kind, as he ought to know how to employ in the fullest possible way the powers of the vessel he commands. In him you must have one who has acquired the science of government, he must be highly educated in both naval and military matters, and from the commencement of his service must develop the capacity of bearing greater and more important responsibilities as time goes on. His knowledge must be universal, and hence he cannot be a specialist in any one of the subjects of which he is cognizant. For example, he ought to have a knowledge of navigation, artillery and torpedoes, but he ought not to be a hydrographer, a gunner or a torpedo engineer in the strict sense of the word. It seems beyond contention that it is possible to concentrate in one single person all the technical and practical knowledge and all the intellectual and moral qualities which are needful to fulfil indifferently the duties of engineer and commander. These views expressed by the Italian Minister of Marine, are absolutely identical with those of a large number of thoroughly practical naval engineers of experience, and the larger the experience the stronger the conviction that it is foolish to attempt the impossible task of cramming into one human frame an amount of specialistic knowledge which three or four such organisms could not effectively retain. There is an old saying that an engineer is born not made, and the idea of telling off a man to be an engineer would seem to indicate that the propounder of the suggestion was ignorant of the basic features of capacity and service. Mr. Sells' view, that the only way to secure thorough efficiency is for the two branches to be restricted to the two professions respectively seems to us to be the sound one, and the greatest care should be taken in watching the new line of development as far as the British Navy is concerned.

LABOUR UNREST

THE recent upheaval in the labour market is a matter for the most serious consideration of those who watch the change in the economic conditions that obtain from time to time and appreciate the effect that they must have upon the life and prosperity of the nation. The past three or four years have shown the development of an attitude by the labour element which every level-headed man must look on with much misgiving. There is little doubt that the inflammatory utterances of political speakers, the promises made of great benefits to be granted with no sacrifices, and the ambitious policy of the labour agitator are largely, if not wholly, responsible for the demoralization that has taken place as shown by the want of appreciation of the responsibilities of labour as a national duty. The striking of first one class of workers and then another without notice, and sometimes without any formulation of grievance is a most disquieting feature affecting the welfare of the nation. The so-called "leaders" of the workmen belonging to unions have lost all control of those whom they were elected to lead, and the incidents of the recent strikes show clearly what was made quite patent in the shipbuilding strikes of last year, that whatever agreement the leaders make on behalf of the men, the men expect the employers to abide by the terms while they can tear up the agreement whenever they like. The trouble at the root of the matter is that the unions, which represent in most cases only a minority of the workers of each class, have been striving to get recognition of the right to represent the whole of the workers of the particular trade, but this is clearly unfair and unjust to the majority of the workers who,

by their own volition, have decided not to join a union or to be represented thereby. Looking at another view of the matter from the standpoint of the liberty of the subject, it is a most unwarrantable thing that a minority of workers in a business, like a railway, should attempt to paralyze the life of the nation with twenty-four hours' notice of cessation of work, and to carry out their intention with menace to the public safety, involving the necessity of calling out the military to control the transit of food and other necessary goods. The Government are to be congratulated on the firmness they have shown in dealing with the situation, particularly by their efforts to bring the opposing parties into the zone of practical discussion of the matters at issue, and by the appointment of a Special Commission to collect evidence and report upon the work of the Conciliation Board. One may express a hope that the statesmanship shown will put an effective stop on the welfare and prosperity of the nation being interfered with by those who are paid to pull down rather than build up, on the false cry of benefiting those for whom they pretend to speak.

GRATITUDE AND KINDLY FEELING.—It is worthy of note that recently a workman who received an injury was treated in the Western Infirmary, Glasgow, and, after being discharged cured, returned to his employment. Shortly afterwards he called at the ward and gave £2 to be spent on something for the ward which would help to alleviate the sufferings of any patient. Subsequently he made another visit to the hospital, and stated that his employer had treated him so kindly and well that he was pleased to be able to give £5 to the funds, and expressed at the same time his thanks for the treatment he had received in the ward.

THE SOLICITUDE OF A BOARD.—The result of a recent action brought by the Board of Agriculture against the master of a steamer for having on board an Eastern sheep which had in the course of the voyage sniffed the atmosphere of a restricted French port, was opportune and a cause for congratulation inasmuch as the law on the subject by common sense interpretation was against the restrictive and narrow view of the Board's officials. It is right and necessary that importation of animals with disease or suspicion of disease should be guarded against, but in the case referred to and probably in similar cases there was, according to the report given of the case before the court, no intention beyond provision of food for the crew on board, besides the animal did not hail from a restricted port. There may possibly be a reason for the view taken by the Board in its solicitude for the safety of the public health, and it may be a rational and commendable one, but this does not show in the report of the trial or the finding of the court.

INSTITUTE OF MARINE ENGINEERS.—PROPOSED SYLLABUS FOR AUTUMN SESSION, 1911-1912:—

Monday, October 2, Discussion on Mr. E. Shackleton's paper, "Modern Developments in British and Continental Oil-Engine Practice." Paper: "Notes on Two-Cycle Oil Engines," by Mr. F. Duncanson, B.Sc.
Monday, October 9, Discussion.
Monday, October 16, Fuel Test.
Monday, October 23, Paper, "Steam Turbine Theory," by Mr. F. J. Kean, B.Sc. (Member).
Monday, October 30, Discussion.
Monday, November 6, Paper, "Specification of the Engines of a Tramp Steamer," by Mr. W. Veysey Lang (Member of Council).
Monday, November 13, Discussion.
Friday, November 17, Annual Dinner at the Hotel Cecil.
Monday, November 20, Paper, "Notes on an Extract from a Refrigerator Log Book," by Mr. Wm. Sinclair (Member).
Monday, November 27, Discussion or Fuel Test.

ALL-CENTRE-LINE BATTLESHIPS.

H.M.S. "Orion" and the U.S. "Florida."

THE advent of the *Orion* marks a noteworthy epoch in the annals of British battleship construction, both from the point of view of design and armament. In her is introduced the American system of gun distribution the placing of the five turrets along the keel-line instead of two being *en echelon*, as in the preceding *Neptune* class—together with the resuscitation of the huge 13·5-in. gun after a lapse of twenty years.

The abandonment of the wing turret in favour of the centre line position may mean a lot or very little. It may be taken as an admission that the *Neptunes* and *Indefatigables* are comparative failures, or it may simply mean that the 13·5-in. gun is too heavy a gun to fire across decks—possibly both. No official details have been published of the results obtained from the *Neptune's* trials, but there is now the best of ground for believing that the off guns will only be fired 'cross decks under exceptional circumstances, and that her broadside must only be reckoned as eight big guns. The trials also proved that the superposed turret cannot fire dead astern without very seriously affecting the men in the lower one.

As, however, the *Orion* was laid down before the *Neptune* was completed, the reason for the change in design must chiefly lie in the second supposition, that whatever the effect of 12-in. might be, the 13·5-in. gun is too heavy for *en echelon* work.

The reason why the 12-in. was dropped was simply that the demand for more powerful battleships, and the impossibility of properly "controlling" more than ten guns made the introduction of the 13·5-in. a *sine qua non*. Twelve 12-in. have been mounted in many ships, but British naval opinion is against such a battery, and the increased calibre means greater hitting power and longer ranges. We have now eight battleships under construction which mount the 13·5-in., and already foreign nations have ordered capital ships carrying even heavier weapons. The comparison of the *Florida* and *Orion* is simply made to show how England has picked up the lee-way in design which at one time she looked like losing. Undoubtedly the American *Delaware* was a far superior ship, as regards fighting qualities, to the first seven English "Dreadnoughts"—that she was better than the three *Neptunes* is also generally conceded. Now at a bound we have made up the lee-way and produced something much better than anything yet afloat on the other side, by adopting the centre-line distribution and bigger gun simultaneously. We may be accused of lack of initiative, but the suggestion that the *Orion* was so designed *because* the U.S. Government had seen fit to favour the centre-line is, of course, ridiculous. The British ship could not have carried her guns *en echelon*, and consequently we join the highway of design that leads to the ideal battleship, not in America's footsteps, but from a side road of increased calibre which brings us out ahead of her.

The external characteristics of the *Orion* may be best gathered from our illustration of the ship, made from her at Portsmouth, where she is completing for sea. It will be seen that the second and fourth turrets are raised to give a theoretical fire ahead and astern over the fore and aftermost, and that the third is placed amidships between the superstructures, and has a wide arc of fire on either beam. A secondary battery of twenty 4-in. guns is distributed over the superstructures so as to allow for a good all-round concentration. These are protected by small shields. It was rumoured that 6-in. weapons were to have been mounted in an armoured upper deck battery, but it is unlikely that anything bigger than a 4·7-in. will be carried in our battleships for some time to come. Other nations consider 5-in. to 6·7-in. guns as the best guard against torpedo attack, but it is evident that the 4-in. is still regarded as adequate protection by the Admiralty. The light shields do not, of course, constitute any protection for battle—they are more as screens against 12-pounder projectiles from attacking torpedo craft, giving that imaginary security which even a canvas screen round a gun will afford.

All are fitted for fire-control, though details on this point

H.M.S. [illegible]

U.S. Battleship [illegible]

at Lackaw. [illegible] the [illegible] is the [illegible] in conning tower which is of novel design, there being no eyeslits but a small raised observation cupola on the top instead. This will accommodate the controller's head without exposing the inside of the tower to splinters, etc.

The navigating bridge is small and narrow and encircles the fore funnel, which is much narrower than the after one. The single tripod mast supports the upper control station and observation platform. It will be noticed that the greater number of the boats are carried out of harm's way behind an armour screen between the mast and second funnel being manipulated by davits only. The after superstructure contains eight 4 in. guns and is roughly hexagonal the front being curved in to allow for the amidships 13·5 in. guns being trained past it. It is surmounted by a small armoured tower and the searchlight and standard compass platforms.

The big guns are of 45 calibres and weigh 76 tons. They take a 1,250 lb. projectile with a muzzle velocity of 2821 f. seconds and muzzle energy of 69,000 f. tons. Exactly what constitutes her armour protection is as yet uncertain. The plan shows the extent of the belts and it is known that amidships these are of 12-in. with diminution to 6-in. to 4-in. at the bow and stern. A space of about 20 ft. is left at the extremities which is unprotected except by sub-division of the hull. Three torpedo tubes firing the new 21-in. Hardcastle torpedo are fitted, one being below water on either side and one astern. Compare this with the huge armament of ten tubes which the new German battleships carry!

Driven by Parsons turbines of 27,000 h.p., the *Orion* has a designed speed of 21 knots and is expected to touch 22·5. There are four screws and two rudders. Her normal coal supply is 900 tons, with a maximum of 2,700 tons oil fuel, while the class of four ships are variously fitted with either Yarrow or Babcock & Wilcox boilers.

The *Orion* was laid down at Portsmouth November 29th, 1909, and launched on August 20th, 1910. She is to go on trial during September. Her sister ships are—*Conqueror*, completing at Messrs. Beardmore's, Glasgow; *Monarch* at Elswick, and *Thunderer* at Blackwall. A further four known as the *King George V.* class, which will have increased dimensions, are now reaching the launching stage.

The U.S. *Florida* is an enlarged and improved *Delaware*, and she and her sister, the *Utah*, are on trial prior to commission. On a full-load displacement of 23,000 tons the *Florida* carries an armament of ten 12-in. and sixteen 5-in. guns. The former are mounted in five turrets disposed as in the *Orion*, except that the third is raised to fire over the fourth and fifth. Their heights above water are—No. 1, 33 ft.; No. 2, 40 ft.; No. 3, 32 ft.; Nos. 4 and 5, 25 ft. The turrets have 12-in. faces and 8-in. backs. The 12-in. guns are of 45 calibres, weigh 53 tons and fire an 850 lb. projectile with a m.v. of 2,800 f. seconds and m.e. of 46,195 f. tons.

Her sixteen secondary guns—designed for battle or torpedo defence—are disposed as follows:—Two are right up forward in sponsons on the upper deck—not on the main deck as were those in the *Delaware* before removal—and another couple in 6½-in. casemates just below the conning tower. Amidships is a 6½-in. battery containing eight, while astern four more are in casemates. They are all separated by 2-in. splinter bulkhead with a ½-in. wall at the rear.

As may be gathered from the plan, the belt protection is complete, the armour amidships being 11 in. and 3 in. at the bow and stern. This belt is 8½ ft. wide. Along the lower deck side from the 1st to the 5th turret base is a 10-in. strake 8 ft. wide, while above this is the battery wall. Special protection includes sub-division and powerful pumping against mine or torpedo damage.

The machinery consists of Parsons—not U.S. Curtiss—turbines of 26,000 h.p., and steam is generated by fourteen Babcock boilers. An excess of about one knot is anticipated above the designed 20·75 knots speed. The *Florida's* normal coal supply is 1,667 tons with a maximum of 2,500 tons and 400 tons oil.

Two submerged torpedo tubes (21 in.) are fitted. The different arrangement of the masts and funnels from those in the *Delaware* should be noted.

Of the two ships, the *Orion* is far the more powerful, although the displacements are very similar. The 5-in. guns of the U.S. ship are not so advantageously placed, but fire a 60-shot as against the British 31 lbs.

The dimensions, etc. of the ships are:—*Orion*, 584 ft. (over all), 88¼ ft. beam, 27¼ ft. draught (mean), 22,080 tons. *Florida*, 521½ ft. (over all), 88¼ ft. beam, 28½ ft. draught (mean), 23,003 tons (full load).

Broadside, 10–13·5 (1250 lbs.) 12,500 lbs.
" 10–12 (850 lbs.) 8,500 lbs.

THE NAVAL AIRSHIP.

It has been expected that the naval airship No. 1 would make her appearance again on the waters of Cavendish Dock, after the alterations which have been made in her, and it was definitely arranged that she should emerge from the airshed on the 17th August, and that she would then start her flights, but it was announced late in the day that owing to a scarcity of hydrogen, and the difficulty of getting supplies of gas during the continuance of the strike, it would probably be a fortnight before she would be ready to take her first flight. This is, of course, a great pity, as the best of weather for aviation purposes has been experienced during the past month or two. The construction of an airship is, however, a delicate undertaking, and everything which has been done has been of an experimental character. There is, further, every desire to make a success of this first airship, and those who are dealing with her will throw no chance away. The vessel has cost a deal of money, and the frequent alterations which have taken place in her design have run up the bill. The experts, however, declare that the delays have been necessary, and that when the vessel is ready for flight she will fully justify all the hopes which have been centred in her success. During the month, Commander Schwann, who has charge of the airship, had a nasty accident with a hydroplane, which he has had constructed for him to work in connection with the airship when in the air. He was experimenting with this hydroplane in Cavendish Dock, when in pulling a wrong lever she suddenly dived into the dock, causing much damage, and risking the lives of those on board. The plucky Commander managed to swim to shore not much worse for his ducking. The hydroplane has since been repaired and is expected to be of considerable advantage to the airship, whose flight may be expected in September. It is intended she shall undergo exhaustive experiments in the dock at Barrow and in Morecambe Bay, where she will be accompanied by H.M.S. *Hermione*. Later on we learn that it has been found necessary either to lengthen the vessel to carry the weight she was designed to carry or to reduce the weight. If this be true her trials may be delayed for some time. The cutting of the airship in two and inserting another section will naturally mean a few months' extra work, and this would mean she would not be available for trials until November, when heavy winds are invariably experienced in Barrow, and this might possibly mean delaying the trials until the spring of next year, but the aeronautical experts are determined to make her a satisfactory ship, no matter what delays arise, and it is therefore probable she will be lengthened so as to enable her to carry a heavier weight than she is capable of at present.

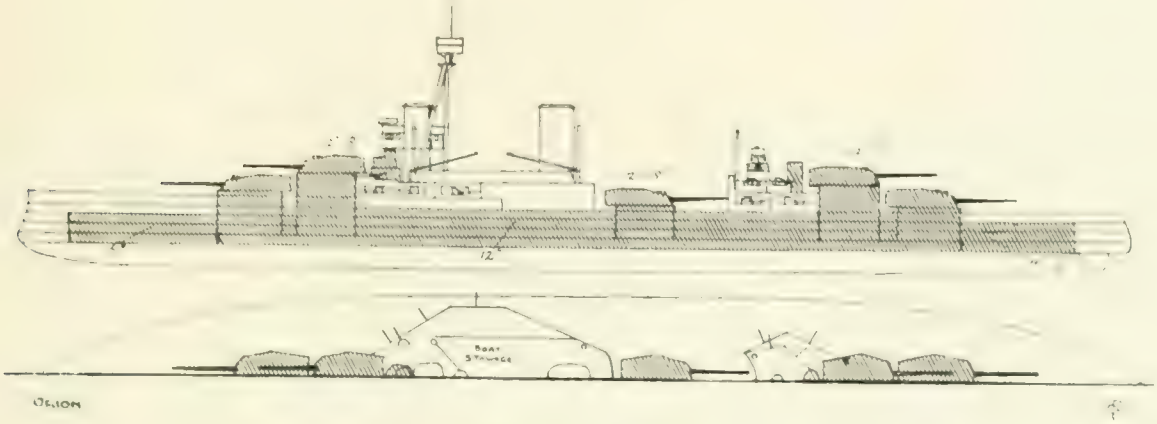
THE S.S. "LAMPEDUSA."—This vessel was launched on the 10th August by Messrs. Mackie & Thomson, Govan. Messrs. Cochran & Co. (Annan), Ltd., have supplied one of their donkey-boilers fitted with patent seamless furnace.

NAVAL MATTERS—PAST AND PROSPECTIVE.

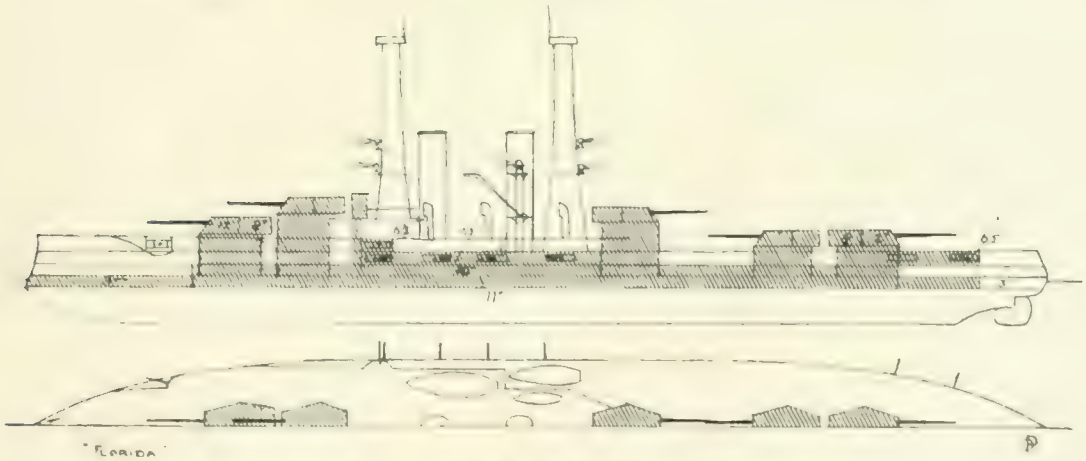
(*From our Own Correspondent.*)

Portsmouth Dockyard.

THE equipment work in connection with the battleship *Orion* is progressing very satisfactorily indeed. Her steam and gunnery trials are to take place in September, and should they prove successful, which there is every reason to hope will be the case, the vessel will be commissioned by the middle of November, which will be within the two years' limit, she having been laid down on November 20th, 1909. The *Orion* will be the first British *Dreadnought* to be armed with the 13.5 inch gun, and the trials will therefore be of considerable importance. It is understood that the vessel will proceed to the Mediterranean for confidential firing tests. The battleship *King George V.* is making very satisfactory headway, and, although she will be on the building slip rather longer than the usual time, those responsible are perfectly satisfied that she will be completed within the stipulated period of two years. Although it has not been definitely stated, it is confidently believed that the King will launch the vessel in October. The cruiser *Argyle*, of the Fourth Division of the Home Fleet, which recently went on a trip to Australia with new crews for vessels on that station, is to be taken in hand for a machinery detect. While the *Kangaroo*, of the Fourth Destroyer Flotilla, was carrying out steam trials off Beachy Head, towards the end of July a steam pipe burst, two stokers being killed and five injured. At the inquest the jury expressed admiration of the conduct of Lieutenant-Commander Coke, Chief Engine-Room Artificer Williamson and Engine-Room Artificer Rimington, who went into the stokehold while it was full of steam to rescue their shipmates. The scout *Highflyer* has gone in company with the cruiser *Bonaventure* to the Mediterranean, escorting six submarines, it having been decided to have submarine flotillas at Gibraltar and Malta. Some interesting experiments have been carried out here with a view to deciding whether submarines could advantageously be provided with steel bands around their hulls for lifting purposes in the event of accident. Two craft of the obsolete Holland type were taken out to the neighbourhood of the Nab Lightship, the scene of the A1 disaster, and sunk with steel hawsers around their hulls, subsequently being raised by lighters. It is expected that the floating dock which is being built by Messrs. Vickers, Ltd., at Barrow-in-Furness, will be ready by the end of the year. A site for it has been dredged in Fountain Lake, that portion of the harbour between the dockyard and Whale Island. The cost of providing accommodation for the dock will be about £[illegible], including the cost of machinery, and £70,000 has been allowed for the work in the current estimates.



Plan of the *Orion*.



Plan of the *Florida*.

Devonport Dockyard.

The battleship *Centurion* continues to make good progress, but no announcement has yet been made as to when she is to be launched. That event cannot be very far

distant, seeing that the vessel has been under construction for seven and a half months. A quantity of the armour plates for the broadside protection has been delivered, and these have been stacked alongside No. 8 Dock, into which the vessel will be moved soon after she takes the water. With regard to the cruiser *Lion*, the water testing of her boilers has commenced, and on August 11th steam was raised in the foremost boiler to assist in providing the pressure power for conducting the test. The barbette and other adjustment work in connection with the 13.5 inch guns is in an advanced stage, and the 4-inch guns and mountings have been lifted on board. At the end of July the harbour was so congested that it was found necessary to berth several ships in the Sound. A number have since left and probably by the end of August over forty vessels of all sorts and sizes will have left the port. The repairs to the cruiser *Indefatigable*, necessitated by the leakage in the fore part of the hull, have been completed, and she has rejoined the First Division of the Home Fleet at Portland. The battleships *Kamilies* and *Resolution*, of the Fourth Division of the Home Fleet, have been paid off and towed to the Motherbank, off Ryde, where they will probably remain until sold out of the Service. The destroyers *Locust* and *Quail* have been sent to Pembroke for retubing, and the *Cygnet* is to be sent to Haulbowline about the middle of September to be similarly treated. The destroyer *Brazen* has completed her refit and has been commissioned for service in the Fifth Flotilla. Submarines *B6*, *B7* and *B8* left on August 14th for Gibraltar, and *B9*, *B10* and *B11* for Malta, to form flotillas at those ports. The submarines proceeded to the Mediterranean under escort of the *Bonaventure*, depot ship for submarines, and the scout *Pathfinder*. Our local submarine flotilla is to be brought up to its former strength. It has already been augmented by the arrival of *B4* from Portsmouth, and on September 1st *B1* is to be transferred from that port. The flotilla has been temporarily strengthened by the addition of C13, C14, C15, C16, and C17 from Portsmouth, so that the number is at present the same as before. The torpedo gunboat *Sharpshooter*, which has been doing duty as a seagoing tender to the Devonport submarines, is to be recommissioned on September 1st for service with Section III. of the submarines at Harwich. We had a visit on August 11th from the Prince of Wales, who, accompanied by Captain Campbell, of the battleship *Hindustan*, in which the Prince is serving as a midshipman, landed and made a tour of the yard. Besides visiting the battleship *Centurion*, which is being built in the South Yard, the party proceeded to the North Yard, where under the 160-ton cantilever crane was the new cruiser *Lion*, being got ready for her steam trials. In the basin was the tenth British battleship of the *Dreadnought* type, the *Colossus*, which was only commissioned a few days previously for service in the Second Division of the Home Fleet; while in an adjoining dock was the Greek warship *Georgios Averoff*, which is being repaired as the result of having grazed a rock in entering the port without a pilot.

Chatham Dockyard.

No announcement has yet been made as to the date of the launch of our new cruiser, the *Chatham*, but no doubt the announcement will soon be made, as the vessel is almost ready to take the water. Her first keel plate was laid on Jan. 3rd. All doubts as to the floating dock in the Medway have now been put at rest, Mr. McKenna having stated that the men working on the dock will be conveyed to and from Chatham. It is estimated that the men will spend one and a half hours daily in making the journey to and fro. If the journey lasts beyond the ordinary working hours of the yard they will be paid for the extra time at the usual rates. There has been much speculation as to Admiral Sir Charles Drury's successor as Commander-in-Chief at the Nore, but it has been announced that Admiral Sir Richard Poore has been selected for the appointment, and that he will take up the duties on August 29th. Admiral Drury reaches the age for retirement for his rank on the 27th, and it looks as if he will be advanced to the rank of Admiral of the Fleet and fly his flag as such for a day before vacating the post. Sir Charles Drury is one of the few Canadian officers in the Navy. Having completed his two years as captain of the dockyard, Captain Ricardo has been succeeded by Captain Grant-Dalton. Another change is that Captain Erskine, lately commanding the battleship *Venerable*, has succeeded Rear-Admiral Thursby as Commodore of the Naval Depot, the latter officer vacating consequent on being promoted to flag rank. The battleship *Bulwark* is to pay off on September 1st for a refit, which is to cost about £80,000. In future the Mechanicians' Training Establishment is, as far as possible, to undertake the repairs of steamboats belonging to the depot, and also of all boats attached to establishments in the port which are not allowed a repair staff, or where the necessary repairs are beyond the capacity of the staff. The defects which cannot be made good by the Training Establishment will be dealt with at the dockyard. Commander Carr has relinquished his appointment at the Training Establishment to proceed to Colombo to take over the command of the cruiser *Psyche*, which is to recommission there for further service on the Australian station. Commander Innes, lately commanding the battleship *Canopus*, has succeeded Commander Carr. We had a distinguished visitor on August 11th in the person of Mr. Meyer, the Secretary of the United States Navy, who was shown over the establishment by the Admiral Superintendent. The Dockyard Awards Committee have granted Mr. Harris, chargeman of engine fitters, £5 for a suggestion as to machining teeth off pinions of 21-inch submerged torpedo tubes.

Sheerness Dockyard.

We still have enough repair work in hand to keep us busy, fresh vessels having come in as others have been completed. The destroyer *Zephyr* has had made good the damage she received to her stem on June 14th in collision at the mouth of the Thames with the *Zebra*, and has proceeded to Harwich to relieve the *Porcupine* on duty with the submarine floilla at that port. The *Zebra*, which lost a 6-pounder quick-firer in the collision, has also been put right, and has gone to Dundee to relieve the *Teazer* in attending on the submarine flotilla there. The destroyer *Express*, which has had a retubing refit, has been commissioned for service in the Fifth Flotilla at Devonport. The *Boyne*, of the Nore Destroyer Flotilla, has had her defects put right and has proceeded to the Firth of Forth to rejoin the flotilla. Another destroyer, the *Snapper*, which damaged her propeller whilst on her way to Scotland, has been fitted with a new port propeller and has resumed duty. Submarine *C9*, which met with a mishap to her bow when going into Hartlepool at night at the end of January, has completed her refit and has resumed duty with the flotilla at Harwich. While in dockyard hands she was fitted with a new bow casting made by Messrs. Vickers, Ltd. Two other submarines, *C1* and *C4*, have been taken in hand for refit. Other vessels in hand are the torpedo gunboat *Leda* and the destroyer *Charger*, while the destroyer *Usk* is being prepared for service on the China station, it having been decided to replace three of the old vessels in the Far East by more modern craft. The cruiser *Juno* is having some defects in her dynamos put right, and when completed she will go to Lamlash to join the ships of the Nore Division of the Home Fleet for battle practice. After doing duty here for over six and a half years as assistant to the commander of the yard, Commander D. J. Munro has gone to Rosyth as King's Harbour Master, he being the first officer to hold the appointment. Many congratulations were received by Captain Munro from his numerous friends here. Another change has taken place. Engineer Lieutenant W. Briggs, who had been nearly four years in charge of the drawing office, has left and has been succeeded by Engineer Lieutenant W. Canwan, who for the past few months has been on duty in the engineering branch at the Admiralty.

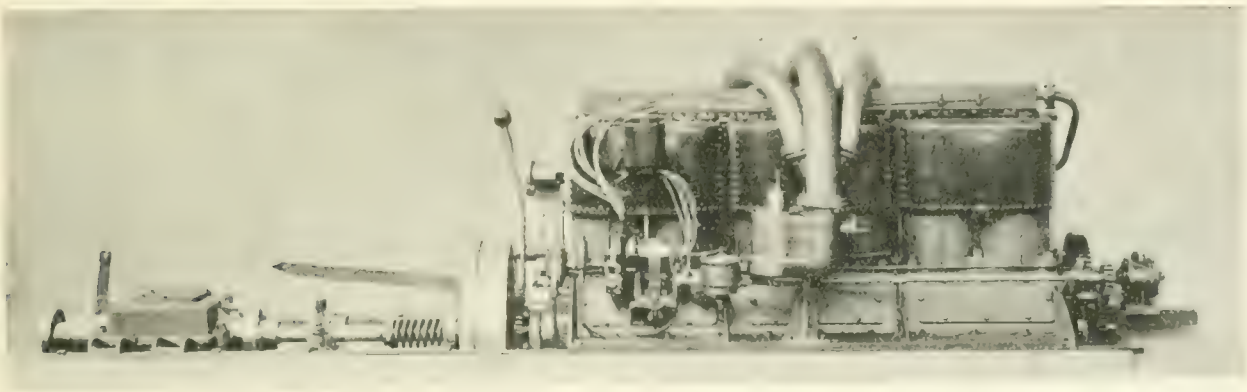
Pembroke Dockyard.

Our new cruiser the *Amphion* continues to make very satisfactory progress. She has been now five and a half months under construction and is in a comparatively forward state. The steel plates forming the decks and platforms are in place and the plating of the bottom and topsides for over half the length of the vessel is also in place. At her present rate of progress she should be ready for launching about the end of November. The cruiser *Active* is to be dry-docked on August 28th to have the angles,

RACING BOAT "TYRELESS III."

THE illustration shows one of the gas engines fitted in the specially designed racing boat *Tyreless III*. The engines were constructed by Messrs. J. W. Brooke & Co., Lowestoft. There are two sets fitted in the boat in the same fore and aft line, the propeller shaft of the forward set is below that of the after one; the forward propeller is a little abaft midships and the after one at the transom. The cylinders are 6½ in. diameter by 8 in. stroke, each set developed 200 h.p. The boat is 40 ft. long by 6 ft. 6 ins. beam, and the photograph reproduced shows her action in the water; the speed attained was 33 knots steady running.

Tyreless III, at 33 knots



Reproduction of photograph of one of the Brooke motors, developing 200 H.P., fitted in the International boat, *Tyreless III*

which were rivetted to her outer bottom, to keep the launching cradle in position, removed and also to have her under-water fittings overhauled, her gun sights tested, and generally prepared for her steam and gunnery trials, which are to commence on October 2nd. The engineer contractors are adjusting the turbines and securing them to the seatings, which work must be done while the vessel is afloat. The basin trial is to take place during the last week in September. The destroyer *Locust*, which was recently paid off at Devonport from the Fifth Flotilla, has arrived to be taken in hand for retubing. The *Quail* is to arrive from the Western port not later than August 31st for a similar purpose. The refits of the *Kennet* and *Itchen* are being expedited. A special effort is being made to get the *Kennet* ready for her three hours' full power trial at sea, which is to take place about August 29th. The vessel when ready is to be commissioned for service in the Mediterranean. The refit of the *Itchen* should be completed early in September, her basin trial having been arranged for September 4th, and her full power trial five days later. The contract for the new patent slip for destroyers has been given to Messrs. Relf and Sons, of Plymouth, who have commenced work. The original estimated cost of the slip was £14,000, which was increased to £22,000 last year, but of this £500 was spent on surveys and preliminary work. Messrs. Relf's tender was £17,695. During the current financial year the sum of £13,500 is to be expended upon the work.

THE IMPERIAL MERCHANT SERVICE GUILD.

THE *Guild Gazette*, which is the journal of The Imperial Merchant Service Guild of August 12th, contains many interesting points recorded in connection with the Mercantile Marine. The services which have been rendered by Lord Muskerry and the House of Lords towards improvements and amendments of grievous hardships in the sea-faring community are referred to in many of the pages, and it does appear that much has been done by the Upper House to help to put crooked things straight, while elsewhere the reverse policy seemed to rule. The Declaration of London, which has been hammered at by many and oft received the consideration of the Guild, and protest was lodged against it on the ground of cutting off food stuffs to the detriment of the United Kingdom. The loyal support given to the shipping firms by the ship's staffs of officers (including engineers) during the seamen's strike is commented upon, and evoked from the Guild a letter of appeal to the firms in question to embrace the opportunity of manifesting their appreciation by increases of pay and other considerations. Notification had already been made by the White Star Company of advances which it was to be hoped established a precedent. The wish is expressed that a movement might spring from the seamen and firemen to improve themselves in respect to discipline; this wish is echoed in many quarters, and, on the other hand, it has been said that if the conditions were improved the men would improve. Comment is made as to the barbarous methods of strikes to induce a rise in wages, and of the more excellent way of moral suasion, and also to the fact that the modern ship-owner has not the personal knowledge of his staff which his predecessors had, therefore is less considerate. The Royal Naval Reserve training arrangements are referred to as new very inconvenient for those who desire to put in their drill. The sight-tests for officers is a vexed question and is discussed in all its bearings as are several other disabilities under which the seafarer suffers, including his want of facility for voting. With this number of the *Guild* is given a photograph of the Secretary, Mr. T. W. Moore, in the court dress he wore when present at the Coronation of King George in Westminster Abbey.

THE NEW OIL-ENGINED LINER AT GLASGOW.

Progress with the Machinery.

IT is expected that the twin-screw oil-engined liner now building on the Clyde will be ready for her trials in about three months. The hull is now plated, and the engineers have satisfied themselves in regard to the problems brought about by the construction of oil-engined vessels on so large a scale for ocean service. One of the sixteen cylinders is set up in the workshop at Stobcross and is seen running under as nearly as possible service conditions. In the making of this cylinder all the necessary exhaustive experimental calculations had to be thought out, but the cylinder has proved so thoroughly satisfactory that all the other cylinders are now being made on the same model.

This large oil liner—as was mentioned in the *Marine Engineer and Naval Architect* some time ago—is a steamer of 5,000 tons gross and 7,000 tons dead weight, now building by Messrs. Barclay, Curle & Co., Ltd., Glasgow, for the Danish East Asiatic Company of Copenhagen. The oil engine is a new adaptation of the Diesel type, and the shipbuilders are associated in this departure with Messrs. Burmeister & Wain, Copenhagen, who for a number of years have been identified with Diesel engines.

In the engine room of this large steamer there will be eight cylinders driving each of the two shafts, and as they are each to be of 21½ inches in diameter, and exactly similar in design, the work of making the two sets will, now that preliminary difficulties are solved, proceed rapidly in the large engineering workshops at Stobcross. The cylinders will be arranged in series, one behind another on their respective shafts, and the design of the machinery is such that if any one or more of the cylinders break down at sea, these can be thrown out of gear, and the shaft can be driven by those which remain in working order. That is to say each cylinder is an independent unit, but each eight or any smaller number may be coupled up so as to work as one piece of machinery. By the adoption of this design it is evident that it would be almost impossible to have a complete breakdown and the liner brought to a full stop.

Another feature that called for close attention in connection with the application of oil power on so large a scale is that of the starting arrangements. All the horse power on either side will not be started at once. Compressed air apparatus will start one cylinder on each or either shaft. When this first cylinder is so set going by the compressed air it will then set its nearest neighbour running, and this one in turn will start the next in the series, and so on until the eight on each of the two shafts are all running. Stopping and reversing will be simple manœuvres.

It is no secret that the Glasgow firm entertain the highest expectations of the economical and satisfactory working of this Danish liner, and a series of demonstration trials will be run at the earliest possible time.

The Hamburg-American line have two cargo motor vessels on the stocks building just now. One is of 5,500 tons, and the other of 4,700 tons, while a British-owned oil-engined vessel of 3,000 tons is being constructed for Messrs. Furness, Withy & Co. on a yard at Middlesbrough. The engines are being made by Messrs. Richardsons, Westgarth & Co., Middlesbrough. As showing the economy resulting in space-saving by the substitution of oil engines for steam engines it may be added that the *Toler*, built at Wallsend-on-Tyne for the Canadian canals, will carry nearly 3,000 tons, or about 97,000 bushels of grain, an increase of about 15,000 bushels over the largest canal carriers fitted with steam machinery.

GAS-COAL AND OIL-ENGINED VESSELS.

ONE of the Continental sailing vessels formerly referred to as being fitted with gas engines to give auxiliary power when required, the *Quivelly*, has been reported on arrival at her destination. During the voyage to New York the engines are remarked upon as having proved of great value, they were underway about two-thirds of the voyage while adverse weather was experienced, they were also utilised for working the ship into harbour, this itself being a saving, and altogether the venture has been a success. A controversy is being waged among fishermen and in circles where they congregate as to reliability results, based upon experience of oil and steam motors for fishing boats: opinions are given on both sides, and from these it is gathered that some of the oil motors have failed at critical times and spoiled catches, and this to a greater extent than steam motors. We have overheard discussion also on the subject of steam *versus* oil engines for land vehicles, among those who use such; these discussions were probably initiated by recent articles and correspondence on the advantages and disadvantages of the two systems, and neither for land vehicles nor for fishing craft have advocates failed to give good reasons for their preference for steam as the motive power. The long experience of steam has brought nearer to perfection steam engines of all kinds and it is but natural that its advantages in respect to simplicity and flexibility should be more manifest, especially when the boats' machinery is in charge of those whose mechanical knowledge and deftness of hand are rather below than above mediocrity; at the same time our observations as to the adaptability of the Japanese and other Easterns towards running successfully the oil-engined boats so much in evidence in the spacious harbours and bays abroad, lead us to think that too little care and attention are paid to the training of the drivers. In the East and elsewhere certificates are granted to men who qualify as drivers of steam launches and other small craft, and from what we can gather it appears that the establishment of such a certificate would be a great advantage both to owners of small craft and engine builders. Drivers of vehicles are required to have a licence and even a farmer cannot drive his dog.cart with his wife as a passenger without one—a somewhat peculiar anomaly—and it would seem quite as necessary for the driver of a motor-driven vessel to have credentials of some sort; probably as time goes on the difficulties as to reliable chargemen will be lessened as experience is gained, meantime the reputation of motors and motor builders is sometimes in the balance owing to preventible occurrences. The tests to pick out the most suitable

motor craft to sail in the International race resulted in three being chosen to represent Great Britain, *Mapleleaf III.*, *The Pioneer* and *Tyreless III.*; these three vessels have given good results in speed to show a basis for choice, from the 50 knots of Mr. Mackay Edgar's hydroplane, *Mapleleaf III.*, fitted with twin screws; and the 40 knots of the Duke of Westminster's hydroplane *Pioneer* with single screw, to the 30 to 35 knots of Mr. Gordon Pratt's specially designed boat with twin screws, *Tyreless III.* These vessels were all to have been shipped in good time for the original dates fixed for the races in New York, but owing to the block of traffic caused by the dislocation of sea-borne material, they were delayed and negotiations were opened to alter the dates to cover the time of the delay, so that it is hoped all three may take part, and if speed and sustained running combined can, with one or other of them, overcome their opponents, the trophy, which has been held in America for three seasons, might be brought back; there are fears, however, that a postponement may be impossible. The proposed combination of the oil companies in Scotland with a view to reduction of working establishment expenses, will probably take effect, and result in a happier condition both for the market and the shareholders of the various isolated companies, while their customers should also be better served. The anarchy and strife which were allowed to run loose, in London and Liverpool, especially during August, unhinged many trades, and amongst them motorists suffered for want of the vital spark or the spirit wherewithal to raise it. The rules and regulations as to the storage of low-flash oils required to be modified and amended to give more encouragement to stock them in larger quantities; some of the regulations are unreasonable, even with regard to fairly high flash-oils. An interesting and comprehensive paper on "Modern Developments in British and Continental Oil Engine Practice," by Mr. E. Shackleton (associate member) has just been published by the Institute of Marine Engineers. The discussion on the subject is fixed for Monday, Oct. 2nd, by which date some data may be available to show to what extent the author's strong advocacy of the gas-oil engine over the steam engine is justified, especially as several of the oil-engined vessels referred to in the paper as in course of construction are now in action. The complete paper was printed in our May issue, so that we need not comment upon it further than commend it for perusal. Messrs. Barclay, Curle and Co. are well advanced with the large vessel they have in hand, and probably before the year is ended the trials will take place. Each of the twin screws is to be driven by a Diesel type of engine of eight cylinders, comprising eight units, each of which is self-contained, working on a crank shaft about 21" to 22" diam. There are difficulties to be overcome to make the gas engine amenable to the exigençies of marine service, and Messrs. Barclay & Curle have sought to overcome these in constructing one unit complete for testing purposes before completing the sixteen, which comprise the two sets. The auxiliaries are to be worked by steam, including the compressor for starting the gas engines. Several of the enquiries referred to previously have resulted in placing orders for oil engines for small boats and fairly sized yachts. Owing to the success which has attended the cruising oil-engined boats in the West of Scotland waters, many of which have made extended running cruises during the holiday season, encouragement has been given to increase the number, and engine and boat builders are likely to reap a good harvest. Messrs. Mirrlees, Bickerton & Day, after having attained a name for their gas engines in connection with land work, electric light and small boats for marine service may have an opportunity soon of entering for larger marine sets. Some of the large oil companies are employing small craft fitted with oil engines to a considerable extent in eastern waters, yet there has been little development of such in this country, although the British Petroleum Co. put an oil-carrying motor on the Thames this year, while the Anglo-American Oil Co. recently issued specifications for a similar vessel. Several British firms are tendering and it is hoped that one or other will be successful in obtaining the contract for both hull and motor. Referring to the lack of continuous good records among the fishing craft, possibly a closer touch between the fishermen and the builders might result in good to all concerned. A standardized motor of simple construction for a fleet of vessels would serve to familiarize the men with the motors in common service. Marine motors have been more in evidence this season on the Norfolk and Suffolk Broads for private pleasure and passenger service, also a few cargo barges which ply to and fro. The oil-engined yacht for the Marquis of Graham is not yet delivered by Messrs. Beardmore, but is nearly completed; the trials of this vessel will be interesting, on account of the engine being of a special construction, simplicity and lightness being claimed as features, while it is directly reversible. There are a few barges building about the Thames with provision made for oil engines, the orders for which have been held in reserve meantime.

NORTH-EAST COAST INSTITUTION OF ENGINEERS AND SHIPBUILDERS.—The 28th session of this Institution will open early in October.

THE MARCONI TELEGRAPH CO., LTD.—A contract has been entered into by the Marconi Wireless Telegraph Co., Ltd., and the Italian Government for the erection by the Company of a 60 k.w. station in the vicinity of Rome. The building masts and material are being supplied by Marconi's Wireless Telegraph Co., Ltd., the erection of the masts being carried out through the intermediary of the Italian agency. Six towers in iron and wood of the Coltano type are being erected, two each being 75 metres high and the remaining four each 45 metres in height. These will support a multiple wire I aerial of a total length of 360 metres, the surface occupied by the aerial will be about 14,000 square metres. The Italian Government are erecting the building, which will contain engine, power, battery and operating rooms, stores, waiting and staff rooms, and the necessary adjuncts. In the engine room, which will have a floor space of 32 ft. by 25 ft., there will be installed duplicate 50 b.h.p. Diesel oil engines each driving by means of a belt a 30 k.w. continuous current dynamo. Two 32 k.w. low-frequency inductances will be provided for regulating the frequency of the discharge circuit to the value necessary for the number of sparks adopted, and in addition two 32 k.w. high-tension transformers will be installed to transform the alternating current by the group of generators to the required voltage for the condensers. The receiving apparatus will consist of a valve receiver adapted to receive all words comprised between [illegible] metres. In addition to the valve receiver a magnetic detector will also be furnished. The station is to test to [illegible] and will have a normal power of 32 k.w. and overload up to [illegible] k.w. The exact arrangement of the plant for this overload has not yet been determined.

THE LATEST CUNARDER.

Launch of the "Laconia" at Wallsend.

The latest Cunarder, the *Laconia*, the third addition to the Company's fleet built in the yard of Messrs. Swan, Hunter & Wigham Richardson & Co., at Wallsend-on-Tyne in the last twelve months was launched on Thursday, July 27th, in the presence of a distinguished gathering. The *Franconia*, the *Anconia* and the *Laconia* have been turned out in quick succession to the *Mauretania*. They are smaller vessels, but the *Laconia* is still the biggest vessel built in England this year.

Mrs. Whitelaw Reid, wife of the American Ambassador, performed the christening service of the new vessel which draws its name from that hollow in the Peloponnesus which is shut in by the mountains of Arcady, and the name is also that of a town in New Hampshire. The vessel will cruise in the Liverpool-Boston service before she goes voyaging between New York and the Mediterranean.

The *Laconia* interprets the last word in comfort in sea travelling. She is fitted with Herr Frahm's anti-rolling tanks. These consist of two water tanks placed on each side of the ship amidships divided into compartments and connected across the vessel at the top by air trunks, and at the bottom by specially constructed water passages. The tanks are partially filled with water, and the movement of the ship is checked by the water flowing from one side to the other through the passages. The water in the tanks can be regulated to suit the cases of any change in movements by opening or closing valves fixed in the air trunks. The *Laconia* is the first British vessel, and the first North Atlantic liner to be fitted with this system.

Everything that can be devised for comfort of passengers is employed on the vessel. The scheme of decoration is throughout most artistic and tasteful. It is a branch of Georgian known in America as Colonial, the only variations being in tone and colour, the dining saloon in white, floor in blue and white; writing room in delicate green, smoking room in grey sycamore. The ceilings are carried out in fibrous plaster on Adams moulds. The second-class accommodation is quite equal to that of the first-class a few years ago.

The *Laconia* is 625 feet long, 72 feet breadth over all, depth from top of houses to keel 90 feet; gross tonnage, 18,200 tons; displacement, 25,000 tons; height of funnels 140 feet above lowest furnace bars, diameter of funnels 17 feet six inches; height of masts, 200 feet above the keel.

The engines have been installed by the Wallsend Slipway and Engineering Company. The vessel is fitted with two propellers, each consisting of four manganese bronze blades secured to a cast steel boss, and each propeller is driven by a four-crank quadruple-expansion engine of latest marine type, having cylinders 33, 47, 67 and 95 inches diameter, with a stroke of 60 inches. Piston valves are found in the H.P., first M.P. and second M.P. cylinders, the H.P. valve having an assistant cylinder. Both are dynamically balanced on the Yarrow-Schlick-Tweedy system for reducing vibration. There are six large double-ended boilers, eight furnaces under natural draught, the boilers being in watertight compartments. A roomy workshop has been built adjacent to the engine-room. For discharge of ashes and clinkers, Crompton's atmospheric hoists and Stone-Lloyd's expellers will be used. There are three engines and dynamos for the electric installation.

THE FLEETS OF THE MAIL LINES.

(*From our Own Correspondent.*)

The Future of the North Atlantic Trade.

IT having been announced that the new Cunarder *Aquitania* will undoubtedly be bigger than either the White Star steamships *Olympic* and *Titanic*, or the new German liners *Europa* and *Imperator* of the Hamburg-American line, it would seem that for the moment increase in size is checked. Time has to be marked to allow dock and harbour accommodation to adapt itself to the rapid increase in dimensions and draught. But the keenness of competition will not be stayed even for a time. So new modes of attracting traffic are in contemplation. Increased speed does not appeal to the shipowner who would have to do something remarkable to substantially outdo the paces of the *Lusitania* and *Mauretania*, and the cost of driving a 50,000-ton ship at a speed of something approaching thirty knots is enough to make the boldest pause. So attraction is to be sought in another direction, according to an article quoted from the "New York Herald," and luxury is to be the bait in the next new steamers. When one knows of the conveniences of existing ships—swimming baths, Turkish baths, gymnasiums, cafés, Ritz-restaurants, *suites de luxe* and such like, one wonders how greater luxury can be even contemplated. But apparently expenditure for expenditure's sake is to be relied on to ensure the patronage of the vulgar rich, and pictures by the old masters are to be provided to please and educate the eye. Genuine old masters are, of course, not only costly, but limited in number, whilst the output—except, of course, of the "fakes" which are turned out for the special benefit of the American millionaire—is not to be increased by demand. Apart from the vulgarity of using the treasures of the past for advertising purposes, one may object that the exposure to the sea air is, quite apart from and in addition to the ordinary perils of the sea, quite likely to further limit the stock available to the next generation.

If new attractions are indeed desirable, might it not be better to devote some thought and expenditure to the work of improving the design of the new ships in regard to their safety under exceptional conditions? Within the last year or two we have seen that even the finest specimen of the modern shipbuilder's art is not quite immune from the ordinary risks of navigation. The statement that "*the new ship has so complete a system of bulkheads as to be practically unsinkable—she would float in perfect safety with any two of her principal compartments freely open to the sea,*" has been shown by collision and by stranding in different parts of the ocean to be a boast which experience altogether does not justify. Might it not be well, therefore, to divert a little of the money which it is proposed to spend on old masters to the more unobtrusive object of multiplying and strengthening the new ship's bulkheads, and to devising some means of more satisfactorily dealing with outbreaks of fire? There is a lesson to be learnt from the inquest held on the visitor who was unfortunately killed in the recent fire at the Carlton Hotel in London. The corridors of the hotel—which was believed to be absolutely fireproof—were lined with wooden panelling, and one of the expert witnesses assured the Court that there was no surer way in which the flames could spread from one part of an hotel to the other than by panelling. The passenger accommodation of our great ships is full of wooden bulkheads, separating the various state-rooms from one another, and of wooden panelling decorating the corridors and public rooms. Cannot this warning be taken to heart by those who are responsible for the design of the next new liners, and whilst minimising the woodwork introduced into the passenger accommodation, might it not be possible to devise some arrangement by which sliding iron or steel plates could be provided—as in warships—which might close

the openings between the various decks in time of emergency and so tend to isolate an outbreak of fire and check the inflow of water not only by the longitudinal and transverse bulkheads but also by the various decks of the vessel as is the practice in modern warships.

The Amazon Steam Navigation Company.

Shareholders in the Amazon Steam Navigation Company are after all to be congratulated on their good fortune. A little while ago when it was announced that their contracts with the Brazilian Government could not be renewed and that the Company must therefore dispose of its fleet and go into voluntary liquidation, it seemed as though they were in for serious loss especially as their ships being, of course, designed for a peculiar river trade, would be highly unsuitable for ordinary commercial purposes. The liquidators of the Company have, however, recently issued a circular to the shareholders in which they make the pleasant communication that they have been able to sell the whole fleet and with it most of the Company's assets in Brazil to a new venture and are thus enabled to at once make a return of £12 10s. a share with the prospect of further substantial remittances in the future. There is one point in the circular which is worthy of record and commendation. It is pointed out that there have been in its employment some very old and faithful servants of the Company who will by the liquidation be thrown out of employment with no prospect of further engagement on account of their age and the request is made to the shareholders that they will sanction the reservation of a sum of 7s. 6d. from the future payments to be made to them in order that the liquidators may form a fund from which due allowances may be made to those whose lives have been spent in building up the Company's prosperity. One can hardly imagine that there will be any dissentients from this proposal.

The new Company which has purchased the fleet of the old is to be called the Amazon River Steam Navigation Company, Limited. It has a capital of [illegible] in one pound shares. The head office is to be in Brazil whereby it will secure the local advantages which the old concern was denied, and it is in close financial touch with the Anglo-Brazilian Bolivar Syndicate, Ltd.

The Fleets of the Narrow Seas.

Whatever sneers—and they are many—can be justifiably launched against the South-Eastern and Chatham and Dover Railways there cannot be said to be much fault to be found with the recent organization of their steamship fleet. For years, of course, they provided the most antiquated and uncomfortable little paddlers especially on the night services. Then came a change. The turbine engine arrived and at once captivated the minds of the management. *The Queen* was I think the experimental ship. Anyhow they were early in the field for a cross-Channel turbine-engined ship, and having tried her and proved her advantages they quickly ordered more. The present additions the *Riviera* and the *Engadine* bring their numbers up to seven—sufficient to maintain all their passenger services with this class of ship. And whilst they have been acquiring good ships they have not forgotten to scrap the old. The paddlers to remain longest on their lists were the three sisters *Dover Calais* and *Lord Warden* which were built at Dumbarton some fifteen years ago by the Messrs. Denny. One of these ships was sold a few months ago and now a second the *Dover*, has followed her. She was of a little over a thousand tons gross register and of [illegible] ft. in length. She is to be towed to Stavanger where her new owners—a firm of shipbreakers—propose to break her up.

Though I spoke of these vessels as no longer in use it must not be presumed that there are now no paddlers on the Dover

The *Laconia*, the latest Cunarder, 18,200 gross tonnage. Length, 625 feet; breadth, 72 feet
Builders, Messrs. Swan, Hunter & Wigham Richardson, Ltd., Wallsend.
Engines by The Wallsend Slipway & Engineering Company, Ltd.

and Calais station. The English Railway Company uses none. But the French mails are carried by two steamships under the French flag, and these are still paddlers, the *Pas de Calais* and the *Nord*. The Folkestone and Boulogne route, being of course entirely under the South Eastern and Chatham management, is served entirely by turbine-engined ships.

Two other channel paddlers, besides the *Dover*, are in the market. They are the *Prince Albert* and the *Ville de Douvres* of the Belgian State Railway. They were built as long ago as the year 1886 at Hoboken by the Cockerill Company for their present owners. Their length is about 271 ft. and their tonnage about 800 gross register. The first-named vessel was lengthened in 1889. Like the British mail steamers, they are to be sold because of the progress of the turbine-engined vessels. The Belgian Government, it should be noted, prefer the sale by tender in sealed envelopes to the sale by auction usually adopted on this side of the Channel.

Whether it be to supersede the disabled *Roebuck* or not, I do not know from the particulars as yet announced, but the Great Western Railway has placed with Messrs. Swan, Hunter & Wigham Richardson an order for a new Channel steamship. At first it was stated that she was to be fitted with geared turbine engines. But a later announcement gives her quadruple-expansion engines, balanced on the Yarrow-Tweedie-Schlick principle, which leads one to imagine that she is for one of the English Channel services of the Company, as the higher speed demanded on the Fishguard route would probably make turbine engines essential.

The Report of the Engineer

to the Mersey Docks and Harbour Board shows what a tremendous business it is to keep clear a navigable channel and to deepen it to modern requirements. During the year 1910-11 the five dredgers in the employment of the Board shifted from the Bar and the Queen's and Crosby channels a total of no less than 18,364,890 tons of sand. Of this total just over three millions of tons were taken from the bar itself. It appears that, in the twenty-one years that have passed since the work of dealing with the bar was commenced, over 46½ millions of tons of sand have been taken from it. Whilst altogether the Board by its dredgers in that period have lifted about 171 millions of tons. This total, as far as I can see, does not include the amounts which have been shifted from the berths off the landing stage and from the dock entrances. But probably, though this work has been a vast convenience to the big liners of to-day, the amount of spoil raised in the process has not been enough to visibly affect the immense totals already given.

The Union Steamship Company of New Zealand

has secured a contract for the conveyance of a monthly mail between Auckland and Vancouver, which will afford through communication between London and New Zealand in a schedule time of thirty-three days. The first despatch from London was announced for the 23rd August, whilst the first inward mail may be expected here on the 4th September. It would appear that correspondence intended for the New Zealand mail *via* Suez on the 22nd September must be specially addressed as to be forwarded by that route, as in the absence of some such indication all mail matter will be sent *via* Vancouver on the following day.

Emigration to South Africa.

We may expect to see something of a boom in land settlement in South Africa, if the Union-Castle Company—as it assuredly will—obtains a renewal of its mail contract, for the Union Government has announced that it has made arrangements to grant a limited number of assisted passages to the wives and children of persons permanently employed in the States of the Union. The assistance promised consists of reduction of 20 per cent. off the standard fares to third-class passengers and 15 per cent. to intermediate in suitable cases, whilst grants will also be made to the travellers. These will vary from £5 in the case of adults travelling third class down to £1 in the case of their younger children. In addition to this special facilities will be given for the transport of emigrants' furniture and personal baggage. On the South African railways considerable concessions in fares will also be made. As the distance between Britain and the Cape is but half that to Australia, and as the country has none of the rigours of the Canadian climate, we may expect to see a considerable movement of population thither when once the Union Government turns its serious attention to the work of populating South Africa's fertile lands.

Lengthening Steamers.

It is curious to notice that two steamships of the Elder Dempster Company are in process of being lengthened on the Clyde. They are the *Zaria* and the *Muraji*, which are being lengthened by some thirty feet by their builders, the Clyde Shipbuilding and Engineering Company. One would have thought that the desirability from an economic point of view of constructing steamships of adequate length had been recognised in the seventies, when so many of the liners of the principal companies underwent the process, when the success of Messrs. Harland & Wolff's long White Star steamships demonstrated the advantages of relatively narrow ships. Exceptional cases, such as the *China*, the *Scot* and the *Augusta Victoria*, were not to be wondered at. But that new ships should almost immediately be lengthened after all the experience that has been accumulated, does seem a little remarkable, especially as Messrs. Elder Dempster's fleet is not the only one to be treated in this way. Two brand-new steamers of the Booth Steamship Company—a line whose chairman is accounted one of our most up-to-date shipowners—are being similarly treated.

The Board of Agriculture and Fisheries

seems to persevere in its old policy of hampering British trade. A week or so ago it organized a prosecution of the British India Steamship Company at the West Ham Police Court for bringing a sheep into the Royal Albert Dock on board the steamship *Colaba* without a permit from the Board. It appears that the vessel in question shipped certain sheep at Calcutta for the consumption of the Lascars who formed part of her crew. On her voyage home the ship did call at Marseilles, which is a scheduled port whence sheep cannot be shipped without such permit. The owners of the *Colàba* pointed out that the sheep came, not from Marseilles, but from Calcutta. This did not satisfy the Board. But it was enough for the police magistrate. He held that the order of the Board was *ultra vires*, and that the contention of the shipowners was correct. Accordingly the case was dismissed with ten guineas cost against the official department which brought it. It is to be hoped that this experience will afford a much-needed lesson as to the desirability of restricting prosecutions to cases where injury is done or risk of infection run. The Legislature did not pass the acts under which the prosecution was brought, merely to enable officials to show their brief authority.

THE DERMATINE CO., LTD.—Mr. C. R. C. Hart, formerly general manager of this Company, has now been appointed managing director.

Those who are interested in this journal, but do not care to subscribe, through being often abroad and thinking copies may not reach them, are notified that no pains are spared by the publishers in securing proper despatch of copies. If the subscriber will send in a list of places and dates where he may be at certain times, no difficulty should arise in copies being received regularly. Whether an address is changed once or a dozen times a year it does not matter. Careful note is taken to ensure proper delivery.

BOILER EXPLOSION.—The report has recently been issued by the Board of Trade in respect of a preliminary enquiry held into an explosion from a boiler on board the steam line-fishing vessel *M. A. Dodds*, which occurred on April 28th, when the vessel was off the Aberdeenshire coast. No one was injured by the explosion. The casualty was due to corrosion of the plate on the water side, which appeared to have begun at the side of an imperfectly fitting stay, in consequence of which the plate became so thin that it was unable to withstand the ordinary working pressure. The observations of the Engineer Surveyor-in-Chief to the Board of Trade were as follows :—"The explosion in this case was not serious in itself, but the vessel was temporarily disabled and was towed back to port as the proper water level in the boiler could not be maintained. The local wasting of the plate had occurred at a part difficult to see. The boiler is about nineteen years old, and, in consequence, requires careful inspection if such explosions are to be prevented in future."

WATER-HAMMER.

By a NAVAL ENGINEER.

THE study of the cause and effect of water-hammer action is of particular importance, and it is hoped that the following general observations will not be devoid of interest.

From the perusal of various reports of explosions and minor accidents due to water-hammer, the following points may be gathered, taking as a typical case the run of steam piping shown in Fig. 1. (1) After the conclusion of a run and fires have died down, the boiler and the steam in the system cools down, leaving a deposit of water which drains eventually to the lower part of the bend G E of the steam pipe. (2) On "raising steam" and opening the main stop valve A, this deposited water is not converted into steam, but remains as water in contact with saturated steam at the same temperature, so that this particular deposit of water is in an extremely unstable condition. (3) The accident, when it occurs, nearly always does so upon the opening of the engine stop valve B, and *then* opening drain cock C. The action of opening the engine valve causes the steam to rush along the pipe at a speed of something like

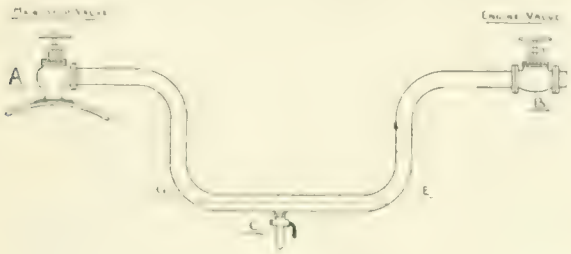


Fig. 1

6,000 feet per minute, at which speed the steam obviously possesses considerable kinetic energy. (4) Under these conditions the fracture usually takes place in the neighbourhood of the bend C E D.

The chief theory so far put forward, and it appears to be a very practicable one, is what is known as the "Projectile Theory." It is supposed that upon opening the drain cock the surface of the water becomes ruffled and broken (more especially so if the cock be suddenly opened wide) and indeed has been shown, in experiments with glass tubes, to present a wave-like appearance. The quickly moving steam picks up the particles of water, or crests of the small waves and dashes them against the sides of the pipe bend with considerable force, so causing the damage. The first impact is at once followed by a series of impacts as each successive wave reaches the bend, so intensifying the effect, Fig. 2. It may be remarked that this wave effect may be easily and safely demonstrated by using thick glass tubes and a steam pressure only slightly exceeding that of the atmosphere.

The obvious preventive measure, presuming that the man in charge is aware of the presence of the water, is to shut either the main stop valve or the engine valve (preferably the main stop valve), so causing the steam in the pipe to revert to a "dead" condition, when the pipe can be safely drained, and once drained can be kept drained. It is evident that in the event of the man in charge not shutting the main stop valve the whole cause of the trouble lies with the drain cock C, and it is with reference to this cock that a few additional remarks may be made.

With the same conditions existing as before, it is obvious that for a drain cock to be effective, (1) it must be large enough to deal with the quantity of water formed at any time; (2) it must be so placed that it will carry away all the water in a reasonable time;

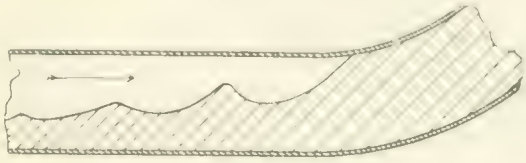


Fig. 2

(3) this water must be carried away, as far as possible, without causing the surface to break into ripples.

Dealing with these conditions, the size of the cock is easily determined and should be as large as is conveniently possible. (2) The position of a drain cock such as is indicated in Fig. 1 is perfectly correct as regards the draining of the pipe when the steam is dead, but

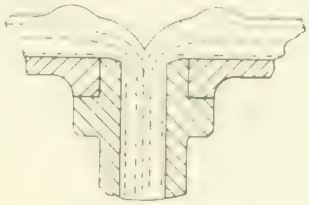


Fig. 3

when the steam is in motion some of the water from G to C can undoubtedly be got rid of, but the pressure and momentum of the steam will prevent the portion of water from C to E from flowing down the orifice. A small slant of the pipe will not be sufficient to counteract this action. (3) With the present form of cock, as soon as it is opened, a difference of pressure

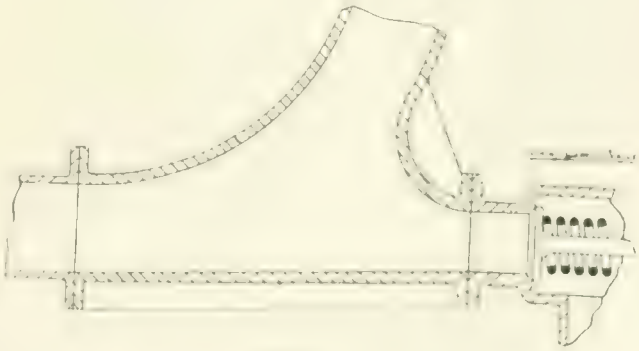


Fig. 4

is caused and water will be blown out, and a kind of vortex formed above the orifice, as shown in Fig. 3. This hole will at once be filled with the on-rushing steam, and according to the projectile theory the portion of water from C to E will be picked up and dashed against the side E D, causing hammer action. From this the following deductions may be made: (1) The correct position for a single drain cock is not as shown in Fig. 1. (2) The orifice of the cock is not of the correct form.

In conclusion, the following suggestion may be made, which is particularly applicable to cast pipe bends, but may also be applied to any pipe bend. The correct position for the drain cock is *at* the pipe bend, and the bend should be modified as shown in Fig. 4. The bottom end of the bend is cast to form a hollow cone (or otherwise formed in the case of drawn pipes). The bottom end of this is flanged and a spring loaded valve V, which can also be operated by hand, is fitted, this valve blowing off to the drain tank or as is convenient. This "safety drain valve" should be loaded to say 50 lbs. per square inch above the working pressure.

The opening of this valve will not cause the surface of the water to become ruffled to anything like such an extent as with the ordinary cock, and in the event of water-hammer taking place the excess pressure produced by the blows would be relieved by the compression of the spring.

The projectile theory does not account for all effects due to water-hammer, as the momentum of the projectile of water, although considerable, cannot be great enough at low pressures to cause such considerable damage as has been caused.

THE INSTITUTION OF NAVAL ARCHITECTS.

Jubilee Meetings.

(Continued from page 13.)

WARSHIP BUILDING, 1860—1910.

In his paper on warship building, Sir Philip Watts traced the progress that had been made from 1860 to 1910. He said that the birth of the Institution of Naval Architects witnessed the launch of the *Warrior*, the first armoured sea-going warship for the British Navy. At that time the two most powerful Navies were those of Great Britain and France, and the heaviest gun carried was the 68-pounder. An important change in the design of warships took place in 1863, when the late Sir E. J. Reed became Chief Constructor. The size and penetrative power of naval ordnance was increasing and there were then introduced shorter and handier ships provided with a complete double bottom and carrying a smaller number of the heaviest guns then made mounted in a short central battery built above the ordinary water-line armour, the latter extending from stem to stern. All those principles were embodied in the *Bellerophon*, laid down in 1863. She had a displacement of 7,550 tons, 6,500 i.h.p., and a speed of 14 knots. She carried ten 12-ton guns capable of penetrating 10 in. of iron armour at 1,000 yards. All war vessels built before 1865 had single screws and simple engines, the average weight of machinery being about 3½ cwt. per i.h.p. The *Penelope*, launched in 1867, was the first important armour-clad vessel built for the British Navy to be fitted with twin screws, and the armoured corvette *Pallas*, launched in 1865, was the first armoured ship to be fitted with compound engines which gave a considerable reduction in fuel consumption. While the armour-clad steam Navy of Britain was in course of creation important events were taking place in America, for it was during this period that armour-plated ships took part for the first time in actual engagements. These engagements showed that wooden unarmoured ships were helpless against the smallest armour-clad vessel, and at the same time brought into prominence the turret system of mounting heavy guns, which had been invented by Captain Cowper Coles several years previously. The British Admiralty then decided to build sea-going turret ships, of which the *Monarch* was the pioneer. It was soon recognised that full sail power was, on the whole, a disadvantage in turret ships, and an important step was taken when the *Devastation* the first mastless twin-screw sea-going turret ship, built for the British Navy was laid down in 1869. She was 285 ft. in length, 9,190 tons displacement, her sides were protected by 12 in. of iron armour, and she was fitted with two revolving turrets, each carrying two 35-ton guns, capable of penetrating 15 in. of iron at 1,000 yards. She had twin-screw engines of 6,650 i.h.p., giving a speed of 13.8 knots. In France up to the year 1873 nearly all the armoured ships had wooden hulls, and the turret system was only represented in coast defence ships. The German armour-clad ships had iron hulls and sea-going turret ships were represented. The Italians, who at that period began the reconstruction of their Navy, showed great originality in ship design. In the British Navy compound armour was first used on the turrets of the *Inflexible*, laid down in 1874. The *Sans Pareil*, built a few years later, was the first battleship to be fitted with triple expansion engines. In England after several iron-clad rams had been constructed the British advocates of the ram designed the *Polyphemus*, the offensive powers of which depended entirely on the ram and the torpedo. The *Hood*, built in 1889, was the last turret ship constructed for the British Navy. The *Majestic* was laid down in 1893, and was followed by the *Formidable* and *London* classes, these ships having a speed of 18 knots and being afterwards fitted to burn oil fuel as well as coal. The *Dreadnought*, the first ship of all the big gun type, was the first battleship to be fitted with turbine machinery. In that vessel, the three *Bellerophons*, and three *St. Vincents*, the guns in the wing turrets were not available for use on both broadsides, while in the *Neptune*, *Colossus*, and *Hercules* they were, the turrets being placed *en échelon*. In the four ships of the *Orion* type four guns could fire directly ahead, four astern, and the whole ten on either broadside. A more powerful anti-torpedo-boat armament had been given to the ships which followed the *Dreadnought*. An Act was passed in 1906 providing that in 1917 the German Navy should possess 38 battleships, 20 large cruisers, 38 smaller cruisers, besides torpedo craft, etc., all of the best types; and in 1907 the *Nassau*, *Posen*, *Rheinland*, and *Westfalen* were laid down. They were 455 ft. in length, of 18,600 tons displacement, and 20 knots speed, and were armed with 12 11 in. guns (mounted in six barbettes), 12 5·9 in., and 16 3·4 in. guns. They had an armour belt 12 in. to 4 in. in thickness. The next three vessels, *Thuringen*, *Heligoland*, and *Ostfriesland*, laid down in 1908, were 490 ft. in length, of 21,650 tons displacement, and 30,000 h.p., and were armed with 12 12 in. guns mounted in six barbettes (two pairs at each end of the vessel and one pair on each broadside), and 14 5·9 guns. The vessels laid down in 1910 were reputed to be still larger. In the American Fleet the *North Dakota* was fitted with reciprocating engines, and the *Delaware* with Curtis turbines, the former developing on trial 28,570 i.h.p., and the latter 31,820 i.h.p. Parsons turbines were fitted in the next four ships, which were laid down in 1909. Of these, two ships, the *Utah* and *Florida*, were similar to the *Delaware* with regard to dimensions, protection, and speed, and they carried a similar armament, but were of 1,825 tons greater displacement; while the *Arkansas* and *Wyoming* were 550 ft. in length and of 26,000 tons displacement, and had engines of 28,000 h.p. to give a speed of 20.5 knots. They were protected by Vanadium steel armour of 8 in. to 11 in. thickness on the sides and barbettes, and carried 12 12 in. guns and 21 5 in. guns, the former arranged in six pairs, all on the middle line. In the projected battleships to follow these two vessels the main armament was to consist of ten 14 in. guns.

FIFTY YEARS' DEVELOPMENTS IN MERCANTILE SHIP CONSTRUCTION.

This paper dealing with 50 years' developments in mercantile ship construction was presented by Dr. S. J. P. Thearle, chief ship surveyor to Lloyd's Register. Had there been no *Great Eastern* to take into account, the author said, the progress of mercantile shipbuilding would have been an instance of gradual development. As long

since as 1853 the construction of the *Himalaya* at the Thames Ironworks showed that the foremost iron ship builders could even then design and build a good ship. In the year 1860 the mercantile marine of the United Kingdom consisted of 27,663 vessels, of 4,658,687 tons net register, of which 25,663 vessels, of 4,204,360 tons net, were propelled by sails, and 2,000 vessels, of 454,327 tons net, by steam. At the end of December, 1909, the merchant shipping of the United Kingdom consisted of 21,186 vessels, of 11,585,878 tons net, of 18,402,201 tons gross register. Of these 9,392 were sailing vessels, of 1,301,060 tons net, or 1,407,469 tons gross register, and 11,797 vessels, measuring 10,284,817 tons net, or 16,994,732 tons gross, were steamers. In order to realise the expansion which had take place it should be noted that while the steamer tonnage had risen from 454,327 tons to 10,284,818 tons, the sailing tonnage had been reduced from 4,204,360 tons to 1,301,060 tons. The cargo carrying capacity of the present day in comparison with 1860 was in the ratio of 6 to 1. The average tonnage of ships in 1860 was for sailing vessels 154 tons, and for steamers 227 tons, while in 1910 the average gross tonnage was over 3,000. The early steam colliers were the progenitors of the typical mercantile steamer of to-day, but it was not until about the year 1880 that the cellular double bottom in anything like its present form appeared in ships of the mercantile marine. Even as late as 1889 the two fastest and largest vessels in the Atlantic passenger trade were constructed without double bottoms and with ordinary floors and double angle-shaped keelsons standing upon them. During the last few years the question of double bottom construction had received much attention from ship builders, and it had been suggested that the strength of a cellular double bottom was in most cases in excess of the requirements arising from stresses at sea, and even from ordinary dry docking. The necessity for carrying a certain amount of water ballast had more to do with fixing the depth of floors and girders than strength requirements, and various arrangements had been devised for diminishing the weight of the material in the double bottom without reducing its water ballast capacity. Time would show whether any or all of these arrangements would prove sufficient in the different circumstances which might arise. In recent developments there was a rapidly growing tendency to omit angle side stringers in holds and to compensate for their omission by increasing the thickness of the shell plating. This detracted in no degree from the strength of the structure, but had the advantage of cheapening production. With regard to pillaring, the first step in a progressive direction was when tubular pillars were introduced, but great changes had been made during recent years in connection with beams and pillaring. Beams were now for the most part fitted at every frame. The influence of the Bulkhead Committee of 1891 was to be seen in the practice of to-day, when the general practice was to use vertical stiffening only. Many important departures in steel ship construction had been made during the last few years, including the turret steamer, the tank steamer of the Doxford and Repsher types, and the cantilever frame wing tank steamer built by Sir Raylton Dixon and Co., but the most interesting recent development in ship design was that of Mr. Isherwood. Upwards of 60 vessels on his designs, representing about 350,000 tons gross, had been ordered by different companies, and 40 of them had been built and were at sea. The experience so far obtained regarding their structural efficiency had been generally satisfactory.

Fifty Years' Changes in British Warship Machinery.

This paper was contributed by Engineer Vice-Admiral Sir Henry J. Oram. He remarked that the founding of the Institution coincided with the period when the definite abandonment of the paddle wheel as the means of propulsion of warships had occurred and the screw had been adopted in lieu. In all the warships built in 1860 screw propellers were arranged for. The earliest ships with screw propellers had engines designed on the same lines as those fitted in paddle vessels and working at low revolutions. These were adapted to drive the screw by means of gearing, which increased the revolutions of the screws as compared with those of the engine, but in 1860 the gearing had been dispensed with, and the engines on order were of the horizontal type and designed to drive the screw direct. The engines worked at from 34 to 105 r.p.m. at full power, with piston speeds varying from 200 to 550 ft. per minute. The boilers under construction in 1860 were generally of the box tubular form, working at a steam pressure of about 20 lb. per sq. in., the earlier box flue boiler having been discarded. Of the types of marine engines manufactured in 1860, the principal were those of the three leading makers and distinguished by the names of their firm. Messrs. Maudslay's was a double piston-rod engine with piston rods over and under the crank shaft connecting with crossheads and guides fitted on the opposite side of the crank to that of the cylinder. This design was known as the "return connecting rod" engine, and with the single screw then fitted it allowed the horizontal engines to have a longer stroke and connecting rod. The trunk engine made by Messrs. Penn was a favourite type, the absence of a piston rod making a short engine well suited for the space available in a single screw ship. Although with the lower pressures these engines worked remarkably well, difficulties with the trunk became pronounced as the steam pressure rose, and ultimately led to the abandonment of the type. A development of the above design was by Messrs. Humphreys, Tennant & Co., and consisted of leading one piston rod to a crosshead from which rods were passed to the crosshead and guide on the opposite side of ship to that of the cylinder. This design, therefore, also had the return connecting rod. The design, however, which was principally associated with the name of Messrs. Humphreys was the direct-acting engine, having the connecting rod between the cylinder and the crank, the disadvantages of the shorter connecting rod being accepted. This was the prototype of the direct-acting engine which ultimately became universal, and, as the introduction of twin screws allowed of longer strokes being arranged for, the direct-acting engine of horizontal type with connecting rod between cylinder and crank became the universal practice from about 1871 until the introduction of the vertical engine. The change from the horizontal to the vertical type was made in 1885 for the large ships, but sloops and gunboats continued to have horizontal engines till 1887-8. With the further rise of boiler pressure in 1887 came the fitting of triple-expansion engines, which at first were of the three-cylinder variety; but, as powers increased, the low pressure cylinder was divided to reduce the size, and the four-cylinder triple expansion engine became common. The more important improvements effected during the last 50 years had been in the direction of economy of fuel and reduction of weight of machinery and of the space occupied by it. Concurrently with these advantages increased life and reliability of the machinery had been obtained by attention to details of construction and quality of workmanship and material. Much had been done to satisfy the constant demand for reduction in weight by selection of stronger materials for the more heavily stressed parts. Development in the method of production of the materials used included the invention of the Siemens furnace and the production of mild steel of trustworthy and uniform quality in forgings, plates, and castings; the manufacture of high-class seamless steel tubing for boiler tubes and steam pipes; the production of corrugated and other similar forms of furnaces, high-class brasses, metallic and asbestos packings, and other devices required for high pressure steam. There had also been a multitude of improvements in machine tools, some of which, such as forging presses, riveters, flanging machines, welding plant, gauges, and measuring machines for securing accuracy of workmanship had been essential to the turning out of high-class work, and made possible many of the advances now under review, while many others, if not essential to actual construction, had had a marked effect on rapidity of production and reduction of cost. Improvement in economy had been chiefly effected by successive increases of steam pressure, although, in the early stages, the introduction of steam jackets and superheaters produced some direct saving at the lower pressures. The simple expansion engines of about 1870, with steam of 30 lb. pressure, and fitted with steam jackets, superheaters, and surface condensers, were fairly economical, and were a considerable advance on those immediately preceding them. The

gain in economy which resulted from the use of compound engines using steam of 60 lb. pressure over the best previous type of simple surface condensing engines using 30 lb. pressure was from 30 to 35 per cent., and after about 1872 the new engines for ships of the Royal Navy were being made of the compound type. The original steam pressure of 60 lb. was increased about the year 1880 to 90 lb., and then rapidly rose to 120 lb. After the practical success of one or two vessels fitted with triple expansion engines the ordinary compound engine was abandoned in favour of the triple expansion type. The success of this type in association with higher pressures was undoubted, and since 1885, with a few minor exceptions, all new reciprocating engines of the Navy had been on the triple expansion principle, with steam pressure beginning at 130 lb. and increasing to 155 lb. in 1887. A further gain in economy of about 15 per cent. was thus effected. For several years after 1887 the pressure was not advanced beyond 155 lb., except in the case of the torpedo gunboat *Speedy*, which worked at a pressure of 210 lb., the steam being generated in water-tube boilers of the Thornycroft type. This vessel was noteworthy as being the first application of water-tube boilers on a considerable scale in the British Navy. The pressure was gradually increased until, in 1895, several cruisers were ordered with an engine pressure of 250 lb. This was the maximum pressure for which machinery installations for the Royal Navy had been designed. The most important development in the period under review was the introduction of the steam turbine, which was accompanied by a lowering of the boiler pressure from that in use at the time with reciprocating engines, as the advantage to be gained in economy by the use of very high pressures did not appear to be commensurate with the increased weight involved, especially as in the turbine a more fruitful source of economy existed in the direction of lowering the back pressure. The i.h.p. obtained per ton of machinery including water had increased from 5.67 in the *Warrior* to 13.64 in the *Neptune*, and the floor space occupied by engines and boilers had decreased from .785 sq. ft. per h.p. in the former ship to .357 sq. ft. in the *Collingwood*. After briefly referring to the methods that had been adopted for increasing the quantity of steam produced from a given weight of boilers, to changes in the methods of working auxiliary engines, to electric generating engines, to the introduction of liquid fuel, and to the use of internal combustion engines in submarines and small craft, the author made a few remarks respecting the officers and men who had charge of the machinery and the changes which had taken place in their character and numbers. Comparing the total numbers employed in the engine-room department of a first-class ship in 1860 and 1910, he showed that the *Royal Albert*, of 500 n.h.p., the flagship of the Channel Squadron of 1860, had seven officers and 20 men, while the *Neptune*, of 25,000 s.h.p., the present flagship of the Home Fleet, had seven officers and 224 men. The seven engineer officers in the *Royal Albert* consisted of one chief engineer, two first assistants, two second assistants, and two third assistants, of whom only the chief engineer appeared in the Official Navy List, while the 20 men consisted of five leading stokers and 15 stokers, which staff had to be supplemented by hands from deck for coal-trimming when the ship was at sea under steam. The gradual reduction in the comparative number of engineer officers compared with men was evident. In 1860 mechanics entered for the service of the engine-room obtained recognition as junior officers. Such procedure would, of course, now be impossible, owing to the large increase in the number of mechanics carried on a warship consequent on the great extension of mechanical appliances which had recently taken place, and, although the number of engineer officers in modern warships was small, there had been no diminution in the amount of mechanical skill proportionately present.

THE IRON AND STEEL INSTITUTE.—The autumn meeting of this Institute will be held at Turin on October 2nd and 3rd. Members wishing to attend are requested to send in their names at once. Various papers will be read. A prospectus giving an outline of the travelling arrangements has been issued by the Institute.

REFRIGERATING APPARATUS FOR MARINE TRANSPORT.

(Continued from page 4.)

THE ABSORPTION SYSTEM.

IN the absorption system, which, as explained above, has so far only been applied to ammonia, the varying ability of water to hold the gas in solution is made use of. It will be remembered that pretty well all gases can be dissolved in water. The latest view of the leaders of the new science of Thermo-chemistry is, that when a gas is dissolved in water, it assumes the liquid state, giving up its latent heat to the water in which it is dissolved. The ability of water to dissolve different gases increases as the temperature falls. It also increases as the pressure to which the surface of the liquid or to which the gas that is being delivered to the liquid is exposed. At ordinary barometric pressures, for instance, and at 32°F., 1 lb. of water will dissolve 0·899 lb. of ammonia gas. At 42·8°F. the lb. of water is only able to dissolve 0·765 lb. of the gas. At 50°F. the quantity is reduced to 0·684. And so on till at the boiling point of water the quantity of gas that can be held in 1 lb. is only 0·074 lb.

With varying pressure and varying temperature, the following figures hold. At ordinary atmospheric pressure, and at 32°F., 1 lb. of water will dissolve 0·899 lb. of ammonia. At nearly 2 lbs. above atmospheric pressure and at the same temperature 32°F., the lb. of water will dissolve 0·98 lbs. of ammonia. At nearly 4 lbs. above atmospheric pressure, and at the same temperature, the quantity of gas has risen to 1·077 lbs.

At higher temperatures the same increase in the quantity of gas that can be dissolved by water takes place. At 212°F., and at ordinary atmospheric pressure, 1 lb. of water dissolves 0·074 lbs. of gas. At nearly 8 lbs. pressure above the atmosphere 1 lb. of water will dissolve 0·11 lb. of the gas, and so on.

The absorption apparatus consists of two principal parts, known as the generator and the absorber. The office of the absorber is to dissolve the gas which has done its work in the evaporator coils, and to hand it on as explained below, to the generator. The office of the generator is to deliver the gas, under the necessary pressure, to the condenser, in the same manner as the compressor does. The generator and absorber, with the accessories described below, together perform the same office as the compressor does in the compressor system. The generator and absorber both usually consist of iron or steel drums, partially filled with water. In the generator there are pipes into which steam can be delivered, for the purpose of raising the temperature. The cold gas from the evaporator coils passes to the liquid in the absorber, in the same manner as it is drawn into the compressor by the action of the compressor piston. When the apparatus is working, there is a continual delivery of gas from the water of the generator, due to the heating of the latter, a continual passage of the heated and compressed gas through the condenser, where it is condensed to the liquid form, a continued passage of gas through the evaporator coils and a continued solution of the gas which has done its work in the evaporator coils, by the water in the absorber. It will be easily understood that as the gas is driven off from the water in the generator, by the aid of the heat in the steam pipes, the liquid would become poorer and poorer in gas, unless it was supplied with a fresh quantity. On the other hand, the liquid in the absorber would become richer and richer in gas, unless it was continually relieved of a portion. Hence there is a continued passage of heavily charged liquor from the absorber to the generator, and a continued passage of weak liquor from the generator to the absorber. It is an important feature in the absorption system and it is claimed as an advantage that the only mechanical apparatus in connection with the plant are a small pump employed to keep the ammoniacal liquid in circulation between the generator and absorber, and the pumps for the circulating water and the brine pump where brine is employed. The weakening of the solution in the generator and the strengthening of the solution in the absorber, as gas is driven off in the one and is received in the other, facilitate the exchange of weak for strong liquid. The weak solution of ammonia always tends to rise to the top, and conversely the strong solution falls to the bottom. The gas

from the evaporator is delivered to the upper part of the liquid in the absorber, and the water which has become more and more saturated, gradually falls to the bottom. On the other hand, the water that has been deprived of its gas in the generator rises to the top. Hence the suction of the ammonia pump is connected to the lower part of the absorber, and the delivery to the upper part of the generator. Fig. 14 is a diagram showing the refrigerant circuit in the absorption system.

It may be noted *en passant* that the necessary pressure required for the condensation of the ammonia, the pressure at which it has to be delivered to the condenser, is obtained by the continuous delivery of the gas to the gas space in the generator. The action is very similar to that of the steam boiler. As marine engineers know, the increase of pressure which takes place in a steam boiler, when steam is continuously raised, without being drawn off, is due to the presence of the increased quantity of steam. Similarly, in the generator of the absorption system, the continuous delivery of gas, by adding to the quantity of gas present, creates the necessary pressure. The same requirements hold with the absorption system, in the matter of the pressure to which the gas has to be raised before delivery to the condenser, as with the compression system. The pressure at which the gas can be condensed, is ruled by the temperature of the cooling water, and this pressure must be produced in the generator or the apparatus will not go on working.

sometimes employed in surface condensers, of having two pipes one inside the other, is employed. In the "Exchanger" also a certain amount of cooling of the weak hot liquor from the generator is also carried out, in addition to that produced by contact with the cold liquor from the absorber. The hot liquor from the generator gives up much of its heat so can be utilised for raising to passage through the "Exchanger," to the cold strong liquor passing from the absorber, and is afterwards exposed to the action of cooling water before it passes to the absorber. When the apparatus is at work the gas is being continuously generated, continually absorbed, and there is a continuous change of liquor between the generator and absorber, the hot liquor being also cooled on its way as explained.

In addition to the above apparatus, other accessories are necessary. As with steam so with ammonia, when the gas is driven off from the water it does not usually come away alone. There is the same trouble in the absorption system of refrigeration, with watery vapour coming away with the gas, that there is with steam in a steam boiler. The trouble is met in the case of the absorption system by the provision of apparatus called the Analyser and the Rectifier. Both of these apparatus are designed to separate the watery vapour from the ammonia gas. The analyser consists of a number of perforated baffle plates, through which the gas and its watery vapour pass on their exit from the generator. The baffle plates throw back a certain portion of the watery

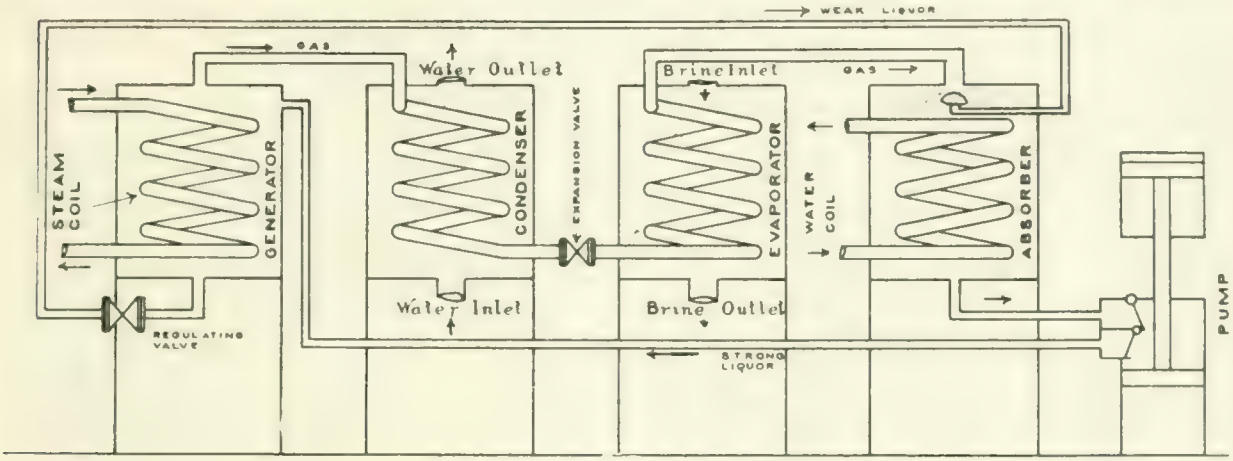


Fig. 14

Diagram of Absorption Plant, showing Generator, Absorber, Condenser and Evaporator

It will be understood that in order that the generator shall deliver gas continuously, the water in the generator must be kept at a high temperature. On the other hand, in order that the absorber shall continue to receive the gas which comes over from the evaporator, the temperature of the water in it must be maintained as low as possible. The weak liquor coming from the generator is at the high temperature ruling in that apparatus, while the strong liquor coming from the absorber is, or should be, at the low temperature ruling in that portion of the apparatus. If the weak liquor from the generator is allowed to deliver straight to the absorber it will increase the difficulty in the way of the latter performing its work, by raising the temperature of the liquor already there. The strong liquor from the absorber, if it is delivered at its low temperature to the generator, will lower the temperature of the liquor already there, and increase the quantity of heat required to cause a continuous delivery of the gas. To meet these difficulties, a very ingenious apparatus has been devised, known as the "Exchanger." In the "Exchanger," which has various forms, a common form being one of the liquors passing through pipes, while the other liquor passes around the pipes, the two liquors are brought into close conjunction. The "Exchanger" consists usually of another drum containing pipes, through which as explained above, one of the liquors is continually passing, the other liquor occupying the body of the drum around the pipes. In a recent modification of this arrangement the method that is

vapour into the main body of the liquid in the generator. In the rectifier, the gas is subjected to the cooling action of circulating water. Ammonia gas has the same property of absorbing watery vapour that air has, though there are no figures so far as the writer is aware, showing the actual quantities. The same rule holds, however, that as the temperature of the gas rises so does its capacity for absorbing the vapour of water and *vice versa*. Hence when the gas is cooled, it loses its ability to hold watery vapour, in proportion to the extent of the cooling, the result being that watery vapour is condensed and deposited, and finds its way back to the main generator.

In the latest form of absorption plant, that made by Messrs. Ransomes & Rapier, the drums are mounted one above the other. Two drums, one being the generator, and the other the condenser, form the base of a sort of pyramid. Above are mounted the absorber, the exchanger and the rectifier, the last named being at the top. One circulating pump and one set of circulating water are used for the condenser, the rectifier and the exchanger.

(To be continued.)

[illegible] Latest. [illegible] With reference to the [illegible] Wallsend Slipway [illegible] Co. [illegible] has been applied to the bunkers and cellular double bottoms, etc., and their patent "Bitumastic" covering to tank top in boiler rooms.

FOREIGN NOTES.

GERMANY.

The new twin-screw steamer for the Hamburg-South American Steamship Company has recently been launched at Hamburg and has been given the name *Cape Finisterre*. Her displacement is 20,000 tons, the engines develop 11,000 H.P. and impart to the vessel a speed of 17 knots. The chief dimensions are—Length, 170 metres; breadth, 20 metres. The vessel is divided into four classes. The first class contains 207 beds in spacious rooms placed amidships on six decks, the state-rooms and cabins being on the upper deck, each of which has its own bath and dressing room. There are four complete "flats," consisting of two rooms and the usual accessory rooms for attendants, etc. Broad stairs and a lift enable a convenient intercourse between the first-class saloons and the main decks. An innovation which will be much appreciated is the dining-room for children. There is also a swimming-bath and a gymnastic hall and also a "dark-room" for the use of travellers; a telephone is also at their disposal. The second class is fitted up for 102 passengers on the main deck, and has its own dining-room, a ladies' drawing-room and a smoking-room. Between the second and the third-class there is a IIa.-class for 120 passengers with two dining-rooms and a promenade deck. Between decks there is accommodation for 870 passengers. It is a special feature of the *Cape Finisterre* that the rooms, cabins, etc., are airy, lofty and amply dimensioned, well lighted, and have a very efficient ventilation. The steamer starts on her maiden voyage in November. The *Cape Finisterre* will be fitted up with the latest improvements to ensure efficiency and comfort. Anti-rolling tanks and "wireless" are being installed. The furniture of the cabins, drawing and dining-rooms are to be most comfortable and luxurious.

Four large steamers just built in German yards have been fitted with "Howden's" forced draught. They are, respectively, the *Schildthurm*, of the "Hansa" Company, a cargo steamer, of 5,000 tons, which on trial made 14½ knots. *Furst Bulow*, of 9,000 tons, for the Hamburg-America Line. On her trial run the engines developed 4,000 H.P., and a speed of 12 knots was obtained. The *Adelaide*, of 9,600 tons displacement, for the same line, is well equipped for handling cargo expeditiously. Refrigerating apparatus has been installed, as meat and other perishable goods will be carried. The fourth vessel is the *Muansa*, for the German East Africa Line, of 9,000 tons deadweight. She is fitted up with requirements necessary for the hot climate where she is to do duty.

The s.s. *Wiegund*, built at the yard "Vulcan," at Bremen, was recently put through her trials, which proved very satisfactory as regards fuel consumption and speed. The chief dimensions of the vessel are:—Length, 127·4 metres; breadth, 16·41 metres; and her displacement is 8,000 tons; she has three decks and seven bulkheads. The cargo is loaded through seven hatches which are served by eleven winches and derricks, two of which can lift 30 and 40 tons. The *Wiegund* is equipped with electric light and "wireless." The triple-expansion engine of 3,350 I.H.P. will give the *Wiegund* a speed of 12 knots, and is supplied with steam by three boilers of together 800 sq. metres heating surface working with forced draught on the Howden system.

Very shortly orders will be placed by the German Government with two private yards for two battleships, the one to replace the *Kurfurst Frederick Wilhelm*, and the other the *Weissenburg*, as both these vessels have been removed from the German Navy list. The order for an armoured cruiser is also to be placed with a private German firm. This may mean that requirements for the mercantile fleet may have to be built abroad.

Competition for a yacht with auxiliary motor.—The length of the vessel is to be 10 metres, and it is specially desired that foreign engineers should compete. For particulars, applications are to be made to the Secretary, Deutscher Yacht Verband in Berlin. The first prize is £20 and the second £15. The designs should be in the hands of the Secretary, Mr. Ilgenstein, 14, Dresdener Street, Berlin, by the second of October.

The shipping Company "Hansa" has just placed an order with a Hamburg yard for a cargo steamer of 9,000 tons, length 133·2 metres, breadth 17·1 metres, draught 7·6 metres. The engine is to be of the quadruple-expansion type and to develop 3,000 H.P. to give the steamer a speed of 11 knots. The new steamer is to be delivered in June, 1912.

The Schloss building yard at Harburg has secured several orders for Brazil. A tugboat of 13 metres length with compound engine of 60 H.P., speed 9 knots. A passenger steamer of 35 metres length, 7 metres in breadth, with an engine of 325 H.P. This firm has further orders for various steamers for Peru and Italy.

ARGENTINE REPUBLIC.

An order for a large dock, able to receive "Dreadnoughts," has been placed with a German firm for the Government dockyard at Bahia Blanca. The order has been ratified by the Legislative Assembly, which has made a grant of 7,000,000 gold pesos for this purpose. This order is considered to be an immediate result of the visit of the *Von der Tann* to South America.

TURKEY.

Tenders are invited for eight coastguard steamers of various sizes, two at 200 to 250 tons, two of 150 tons and four of 75 tons. The sealed tenders to be sent by the 14th September to the Director-General of Coast-Guards, Constantinople.

BELGIUM.

The Belgian Government demands 2½ million francs for the purpose of building two new Turbine Mail Steamers, for the Ostend-Dover line, to replace two older paddle-steamers. These new steamers are estimated to cost 4,300,000 francs. Shipbuilders may obtain particulars by application to the Belgian Government.

CHINA.

The gunboat which has been built for China in the "Germania" Shipbuilding yard at Kiel has satisfactorily completed her trial runs, and is now being dismantled in order to be transported in parts to its destination. We hope that British shipbuilders will be able to secure their share of orders for China.

The "Vulcan" at Stettin has also a river gun-boat in hand for China, and this has been so far completed that trial runs have been undertaken, which gave complete satisfaction. The contract trial is to take place shortly, when the members of the Chinese Embassy at Berlin will be present The guns will also be tested after the trial run. This river gun-boat will also be dismantled, taken to pieces and transported to China. The boat is lightly built and is of very shallow draught. The final passing of the boat will take place after it has been pieced together again in China. The Chinese intend to build up a fleet of river gun-boats, as they are of great use on the big rivers of China.

RUSSIA.

It is the intention of the Russian Government to impose an import duty on steam and other vessels which are imported into Russia. This is to come into force very shortly. Shipbuilders who have hitherto built vessels for Russia will thus lose a good customer. It is further decided to pay a substantial premium for every vessel built in Russia to encourage shipbuilding.

UNITED STATES OF AMERICA.

The Secretary of the Admiralty, Mr. Meyer, is on a voyage to Europe with the intention of visiting shipbuilding establishments on the Continent and in this country. Rumour says that the placing of orders for machinery forms a part of his mission. We hope that British shipbuilders will secure advantages from the visit.

FRANCE.

The armoured cruiser *Dupuy-de-Lome*, which has been struck off the list of men-of-war on account of its having become unserviceable, has been sold to the Peruvian Government. The destroyer *Fourche*, which is equipped with Rateau turbines, has recently attained a speed of 34 knots.

ITALY.

On August 10th, the new battleship *Conte di Cavour* was successfully launched at Spezia. The dimensions of the vessel are as follows:—Length between perpendiculars, 168·96 metres; beam, 28 metres; draught, 8·452 metres; displacement, 21,500 tons; turbines, 24,500 H.P., and her speed will be 22 knots. She will carry 994 men, including officers. In all her armament will consist of forty-six guns and there will be three submarine torpedo tubes.

TELEPHONES FOR DIVING WORK.

WE have been favoured with some particulars of the patent apparatus that the well-known firm of Messrs. Siebe, Gorman & Co. of London use for communicating with divers when at work below the surface of the water, and which from the importance of the subject seem to us to call for notice. The first apparatus of this kind dates back about thirty years, but the system was naturally somewhat crude at the beginning, the wires being wound either round the air pipe or passed through the same. There were disadvantages however to both these methods, because the depth of working varies and sometimes several lengths of hose are used. In the end the life line was substituted for the hose-pipe and by this means the wire was inserted in the line itself. This life line is, of course, a necessity to the diver and therefore the change was made without any additional complication. Whatever the depth at which the diver is working, there are only two connections, one at the helmet end and the other at the battery. Besides, by a device of the firm's, there is no strain on the telephone conductors of any kind whatever. The instruments too, both for diver and attendant are perfectly watertight, which in submarine telephoning will be seen to be imperative. On the Admiralty pattern apparatus a bell is always fitted at the attendant's end of the line but the communication is said to be so loud that it is not necessary to fit a buzzer in the helmet to call the diver's attention.

Telephones for Diving Work by Messrs. Siebe, Gorman & Co., Ltd

With these preliminary remarks as to the apparatus generally we describe and illustrate a system by Messrs. Siebe, Gorman and Co., worked under the Graham-Davis patent, by which it is possible for an attendant on the surface to speak to two divers separately or simultaneously, or the two divers to talk to one another when under water, the telephone wire being in the diver's signal line. It will be seen from the illustration how convenient the arrangement is. There is only one battery box and one hand telephone for the attendant's use, so that the working parts may be as few as possible, the rough usage which such apparatus receives rendering this desirable. The cable can be connected and disconnected on the firm's system very readily from the helmet. Care is also taken that the transmitter and receiver in the helmet are perfectly watertight. The cells in the battery are of the best type and securely fitted in a strong teak box, while at the diver's end of the life line a plug connector is provided to screw on to the socket in the helmet. The receiver in the helmet is fitted above the diver's head and the transmitter on one side convenient for use. A loud sounding bell which the diver operates

by pressing a contact piece inside the helmet is also fitted to enable him to ring up the attendant. When not in use the attendant's instruments are placed inside the battery box, which has a special division for holding them. The fact that the Admiralty use Messrs. Siebe, Gorman & Co.'s apparatus exclusively, is a sufficient indication of its quality for the purpose.

ROYAL SANITARY INSTITUTE.

THE annual congress was held at Belfast, July 24th to 28th, presided over by Lord Dunleath; a health exhibition was also opened by the Lord Lieutenant, who, with Lady Aberdeen, has taken a deep interest in sanitation and the improvement of the home life of the people of Ireland. The Lord Mayor and Corporation welcomed the congress at a luncheon in the Town Hall. At the meetings in the Technical Institute many papers were read bearing on improvements in sanitation and health and sickness prevention; several of these were of interest to engineers and some especially to marine engineers. Principal Francis C. Forth read a good paper on "Technical instruction in Belfast," in which he stated "the instruction had led to increased skill of hand on the part of the working men, also to a result which the committee regarded as of much importance, namely, the production amongst the students of a deeper interest in their daily labours and a more scientific attitude of mind towards their work." "Allotment gardens" (Mr. C. W. Black), "The disposal of refuse in the tropics" (Major R. J. Blackham), "Trials of precipitants at sewage disposal works" (Mr. J. P. Wakeford), "Sewerage of upper falls districts" (Mr. D. R. Taggart), were also read in the engineering section. Town planning and the building up of Belfast were interesting subjects, and "The geology of Belfast and neighbourhood," by Mr. Jas. Munce, was of special interest, showing the relation between the soil and certain diseases. "Influence of building regulations on architecture" (Mr. H. D. Searles-Wood), "Artificial lighting of hospitals" (Mr. Jno. Darch), "National sanitoria" (Mr. E. T. Hall), were also valuable papers. On the closing day, at a conference of engineers and surveyors, the President of the Section (P. S. Cowan, D.Sc.), gave an interesting address on the position of inspecting engineers and surveyors, with the important duties of their calling. Important papers followed on the "Discharge of sewage into tidal waters" (Mr. Wm. Harpur), "Dust nuisance" (Mr. J. S. Brodie), "Tar macadam" (Mr. J. Parker), "Belfast tar-macadam plant" (Mr. H. T. Gullan). In the veterinary inspectors' section the President (Mr. Jas. A. Jordan) dwelt in his address on the branding of meat so that customers might know what they were purchasing, whether home, foreign, chilled or frozen. Mr. W. G. Barnes gave a paper on "Meat branding and uniformity of inspection," in course of which he indicated that although Great Britain was well ahead in comparison with other nations in respect to sanitation, it was far behind as to meat inspection. There was a movement on foot to arrange for an international standard of meat inspection, and a conference was to be held on the subject. "Meat inspection in Belfast" was read by Dr. Henry O'Neill (Chairman Belfast Markets Committee), in which he described the procedure adopted, and testified to the care and efficiency of the service rendered to the community by the inspectors. The "Modern abattoir and its methods" (Mr. J. Sherwood New), dealt with a description of the building, the plan of which originated in France, and had been gradually improved by experience in respect to its general arrangement and methods of working. The Port Sanitary Authorities' conference was presided over by Dr. Robert Thomson, who in his interesting address gave an historical sketch of Belfast and its Lough. Dr. Herbert Williams read a paper on "Plague precautions in *re* the destruction of rats." "Importation of unsound food" was discussed in a paper by Dr. W. Hannah, who reviewed the important part which frozen meat had exercised among the population of the country, especially the poor. The total supply of beef available for the United Kingdom in 1910 was 1,209,000 tons, and of mutton and lamb 604,000 tons, being 59·7 lbs. beef and 29·8 lbs. mutton and lamb per head of population; this quantity was equal to about 62 per cent. home grown and 38 per cent. foreign. The value of grain imported was—London £10,000,000, Liverpool £16,000,000 during the year. The Chinese pigs were again interviewed, and their condition stated to be free from blame. The "inedible" fat difficulty was referred to, as were the precautions taken to ensure that it should not be used for food stuffs. The defects found in frozen meat were described and the precautionary measures adopted to intercept the unwholesome parts. There were other papers and discussions on health questions, embracing the home and school life, sanitation, heating and ventilation. The whole congress in its various sections was a decided success and should be productive of good to the nation. We congratulate the Royal Sanitary Institute, while we also express the opinion that Belfast, the Mayor and Corporation deserve thanks and credit for the warm support given to the congress. The Lord-Lieutenant and Lady Aberdeen were worthily thanked for their good work and influence in connection with the health conditions of Ireland and its people.

REVIEWS.

Marine Indicator Cards. By J. W. Sothern. London: Crosby Lockwood & Co. Price 5s. nett.

The author in his preface says he wishes to supply a want for a really practical work on engine diagrams, and though it would perhaps have been thought the subject was one that had been sufficiently discussed already, yet it is easy to see that you can treat it in such detail by an expert that many new features may be brought forward, and this is just what we find here. We have first descriptions of the various instruments used, and these have in recent years been very much improved. The illustrations show this, but we also see in addition how the indicator lever is worked from the cross-head and then the methods employed for obtaining the mean pressure from a diagram. The necessary data required with cards are then given and examples furnished with how to obtain the i.h.p. A description follows of an Amoler Planimeter, which enables the area of a diagram to be measured exactly. How to find the effective pressure on looped diagrams is also shown, with their general principles enunciated. We see how to get at the piston positions on a diagram, also negative and back pressure areas are pointed out with compression and lead, and the author with his opportunities is very clear on the faults shown by diagrams. This, of course, is most important, as it is what we learn by means of the indicator and where generally the valves are wrongly set or other derangements. There are numerous examples of these various faults, and readers will be much interested, being all practical examples as they are. We find, for instance, cards of h.p. and i.p. cylinder with division plate in condenser broken, and in the same case after repair was effected. Leaky piston rings give a faulty card and with the remedy we see the corrected diagram. The effects of decreased exhaust lap, slide and piston valves wrongly placed or loose on spindle, loss of vacuum and even one L.P. cover broken; these and others show the variety of faults the marine engineer has to deal with in practice. The author next proceeds to give expansion curves according to Boyle's law, and from thence he deduces the effect on terminal pressure by an alteration in the h.p. cut-off. Here the scientific part of the subject comes in, then follows the effect of crank sequence on diagrams and an alteration of cylinder ratio. Crossed diagrams are a peculiar feature, being the indicator connected up to the l.p. cylinder, for example, and the lead fixed to the h.p. Air-pump cards are more common, while the plates showing the position of piston and valve with the diagram that results are very elaborate. Patent valve gear diagrams follow, and those from steering gear engines and compressor cylinders of dry air and ammonia machines and four-cycle petrol engines. How to obtain steam consumption from diagrams and to combine them with the hyperbolic and saturation curves and saturated steam tables, closes what is certainly the highest-class volume on this subject we remember to have met with, and one that certainly enhances the author's reputation.

Fighting Ships, 1911. [illegible] Sampson Low, Marston & Co., Ltd. [illegible]

This invaluable naval annual has now entered upon its 34th year, having grown from a [illegible] the world's navies to a 500 odd page compendium which gives photographs [illegible] of every [illegible] flying the naval ensign the world over. The current issue has [illegible] information and increased number of photographs, of which the book now [illegible] Most of the foreign navies are now adequately covered and the Italian fleet [illegible]. Consequently the novel plan of the "Guide to Contents" [illegible] and the alterations in the arrangement of the chapter stage [illegible] The photograph of the rebuilt *Italia* is also of interest to those who consider the ship with such favour. Those pages dealing with the German Navy are naturally of the greatest interest and [illegible] photographs [illegible] the *Moltke* is, however, inaccurate. Amongst the details of the *Kaiser* class is given their torpedo armament—which is a [illegible] unsuspected size. The latest U.S. ships are very remarkable, and [illegible] are given of the [illegible] The most interesting item in the [illegible] section is a photograph of the Dreadnought *New York*, the first to be published in this country. Plans of nearly all the latest capital ships are given and [illegible] hitherto been available, while photographs of the smaller craft, [illegible] and the auxiliary passenger play an important rôle in war, have been gathered together from all parts of the world. Mr. Jane's book is a most up-to-date [illegible] and what errors and omissions there are are mostly [illegible] due to the late publication of [illegible] as regards the end of the book devoted to the progress of naval aviation from the pen of Mr. [illegible] volume.

TRADE ITEMS.

Messrs. Wailes, Dove & Co., Ltd., have recently issued a novel attack in the shape of a paper knife and letter opener, advertising their "Bitumastic" enamels and solutions. Owing to the increase in business they have found it necessary to extend their telephone service. Their new number is National [illegible] Central [illegible] with private extension exchange.

Messrs. W. H. Bailey & Co., Ltd., are sending out a [illegible] page catalogue describing the well-known Bailey power pumps and booklet on the "Kobra" air compressors.

Toope's Asbestos Covering Co., Ltd., inform us that during the half-year ending June 30th, they have more than doubled their sales of sectional and pasted coverings, especially in expectation and have had to [illegible] new machines for making the various sectional coverings. The addition of the new machines will greatly increase their output which already amounts to 5,000 lineal ft. per day. The staff has been constantly employed day and night to keep pace with orders. The [illegible] has increased to almost [illegible] The Company [illegible] than heretofore to deal with orders of [illegible]

Messrs. T. W. Broadbent, Ltd., have sent us a leaflet, No. [illegible] dealing with their alternating current induction motors for three phase [illegible]

The Clydesdale Chemical Co., Glasgow. [illegible] "Calcite" for the prevention of [illegible] in steam boilers.

The Consett Iron Co., Ltd. Particulars of the Company's manufactures and booklet, comprising various tables and tests.

Messrs. Siemen Bros'. Dynamo Works, Ltd. A [illegible] of domestic motor equipment.

Messrs. Barry, Head & Co., London, have [illegible]

The Institution of Mechanical Engineers. The annual Autumn meeting of the Institution will be held at Newcastle-on-Tyne on Sept. [illegible]

Industrial and Trade Notes.

THE CLYDE AND SCOTLAND.

(From our own Correspondent.)

The London and Glasgow Shipbuilding and Engineering Co., Govan, [illegible] the [illegible] occupied by the Govan Navigation [illegible] contracting their [illegible] fitting-out basin, and a new building [illegible] Admiralty work. [illegible] contract from the United Government is perhaps the most satisfactory item of work in the matter of new orders, to be recorded this month. The Government have been [illegible] to place two more of the destroyers of the *Rattlesnake* type, which were [illegible] constructed by the London and Glasgow [illegible] The contract for the [illegible] placed with Messrs. John Brown & Co., Clydebank, are part of a group of orders which the Admiralty placed for twelve of the twenty destroyers provided for in this year's programme, [illegible] to the Clyde and six to the Tyne, the remaining [illegible] elsewhere. The Tyne firms, Messrs. Swan, Hunter & Wigham Richardson, and Messrs. Heathorn, Lowe & Co., were the lowest tenderers, the London and Glasgow Co. and Messrs. John Brown & Co. being next. The prices tendered ranged from about £[illegible] to £[illegible] and it is understood that the actual [illegible] have been placed at [illegible] The vessels will have a displacement of [illegible] tons, to the original design of the "Tribal" class, but will have more powerful propelling machinery. Their turbines are to be of [illegible] shaft horse power.

Messrs. John Brown & Co., Ltd., Clydebank, have received an order as [illegible] interested for three of the two very [illegible] destroyers recently placed with Clyde and Tyne firms by the British Admiralty. The Clydebank firm who are now very fully occupied with shipbuilding as well as engineering work of importance have also just contracted to build and engine a high-class passenger steamer of [illegible] in length and [illegible] knots speed for the Union Steamship Co. of New Zealand.

The Scott Shipbuilding and Engineering Co., Greenock, have received the contract to build three non-propelling barges of large size for foreign owners. The Company have now had formal transfer made to the Admiralty, of their notable production the "Dreadnought" battleship. After completion of her various trial trips she left the Clyde for Devonport, and was commissioned there on August [illegible] by Captain Dracy, R.N., the Ship for service in the second division of the Home Fleet. The [illegible] was completed in a little over two years and is [illegible] equipped in every respect. The [illegible] was placed with Messrs. Scott of Greenock. The first rivet in her keel plate was driven on July [illegible] by Mrs. Charles C. Scott, and the vessel was launched on April [illegible] in length between perpendiculars, 85 ft. extreme breadth, with a mean draught of [illegible] ft. The [illegible] give [illegible]

Speed Trials of New Vessels. [illegible] of water at Skelmorlie, and the trial trip arena on the [illegible] of Clyde, [illegible] on August [illegible] three twin-screw steamers of about 8,000 tons, which were [illegible] African service. The other two [illegible] constructed at Belfast and [illegible] Williamson respectively. The [illegible] Gourock [illegible] from the yards of Barclay, Curle & Co., on August [illegible] A [illegible] undergoing trials on the [illegible] Clyde [illegible]

Messrs. Alex. Stephen & Sons, Linthouse, and launched from their yard about the end of June. The third vessel on trial was the double-screw ferry steamer *Halifax*, which was built by Messrs. Napier & Miller, Old Kilpatrick, to the order of the Dartmouth Ferry Commissioners, Nova Scotia. The machinery of this vessel, consisting of two sets of compound engines, was supplied by Messrs. Aitchison Blair, Ltd., Clydebank.

High-Speed Channel Steamer.—A noteworthy fact has to be announced in connection with the first voyage of the *Riviera*, the latest addition to the fleet of the South Eastern and Chatham Railway Co.'s Cross-Channel steamers, whose progress in the yard of Messrs. Denny Bros., Dumbarton, was noted in these columns from time to time. Leaving Boulogne, on 22nd July, on her return voyage with a large party on board, including the Boulogne Chamber of Commerce, she accomplished the run to Dover in one hour three minutes. It is interesting to note that the *Riviera* is the first passenger vessel fitted with water tube boilers, and this notable performance will make it possible to further shorten the journey between London and Paris.

Messrs. James Adam & Sons, Gourock, have received two important orders. One is from the Yacht Club Argentine, Buenos Ayres, for the construction and erection of a slipway with yacht carriages, etc., capable of docking vessels up to 80 tons, and will be used by all the racing yachts belonging to the club, which include 40-tonners, 12 metre, 8 metre, and 6 metre boats. The work will be superintended personally by Mr. James Adam, who leaves Gourock shortly for Buenos Ayres. The second order is from the British Admiralty for four cutters, two 30 ft. in length, and two 32 ft. in length, to be delivered to *H.M.S. Southampton* by end of year.

The British Hydraulic Foundry Co., Ltd., of Whiteinch, have been commissioned by the Belfast Harbour Commissioners to supply sixty-six sets of cast-iron bilge blocks for the new graving dock at that port at the price of £11 10s. per set of four blocks.

Amalgamation of Tube Makers. — Rumours emanating from reliable sources are afloat as to the amalgamation of all the leading firms of tube makers in Scotland into one concern. In fact, some time ago the parties interested signed a preliminary agreement. The following companies are concerned in the scheme:—The Wilsons and Union Tube Co., David Richmond & Co., David Marshall & Sons, James Eadie & Sons, Hendry Bros., Ltd., the Caledonian Co., the Coats Co., and the Tradeston Co. Messrs. Stewarts and Lloyds are the only exception, but they will be large shareholders and nominate a director on the board. The concern will be known as the Scottish Tube Co., Ltd., and the capital will be £600,000. It is expected that the prospectus will be issued in October.

The British Oxygen Co., Ltd., Elverton Street, Westminster, London, whose branch works at Polmadie, Glasgow, have recently undergone considerable extension and thorough re-arrangement to cope with general business demands, are alive to the importance of the field—as yet quite unexploited—which lies before them in repairs to ships and machinery afloat. In conjunction with acetylene gas the power and possibilities of the specially devised oxy-blowpipe are simply marvellous in regard to cutting as well as welding of metals. This is being demonstrated almost every day in practice *on land* in connection with foundry work, boiler-making, ship-repairing, ship-breaking, etc. (not to speak of railway locomotive and tramway work—somewhat outside our province); but more notable still—from our special point-of-view—in practice *afloat*. A recent case reported from Aberdeen is worthy of notice. Through one cause or another the combustion chambers and tube plates of a boiler on board a tug steamer collapsed, and instead of laying the vessels up in dock the owners enlisted the services of the British Oxygen Company's staff and plant, and by a well-devised plan of cutting, heating, welding, and replacing of parts, thorough repairs were effected *in situ* in two days' time, which otherwise would have taken weeks to effect with the boiler unshipped—if indeed a new boiler altogether had not been found to be necessary. Ship-repairing firms on the Clyde, as elsewhere, are rapidly being impressed with the economies of the newer methods of repair.

THE TEES AND HARTLEPOOLS.

(*From our Own Correspondent.*)

Middlesbrough.

Messrs. Sir Raylton Dixon & Co., Cleveland Dockyard, are still very busy with work on hand, and are reported as having secured the order to build a large steamer for Liverpool owners.

Messrs. W. Harkess & Co., Ltd., continue to be very busy, having a good amount of work on hand and to start with, but no new orders are reported during the month.

Messrs. Richardsons, Westgarth & Co. are reported to have secured the order to construct the oil engines for a cargo steamer to be built on the Tees for Messrs. Furness, Withy and Co., of West Hartlepool; they continue to be busy in nearly every department.

Messrs. Smith's Dry Dock Co. are busy with work on hand and have a fair amount to start on, all departments being nearly full up both on new and old work.

Stockton and Thornaby.

Messrs. Richardson, Duck & Co. continue to be busy with work on hand; although nothing new is reported during the month they expect to secure an order for a steamer that is in the market.

Messrs. R. Ropner & Sons are busier than they have been for some time, having quite a considerable amount of work on hand and to start with, which will keep them busy throughout this year.

Messrs. Craig, Taylor & Co., are fairly busy; reports are that they have secured an order for a cargo steamer but lack confirmation; they, however, have a considerable amount of work on hand.

West Hartlepool.

Messrs. W. Gray & Co. continue to be very busy; they have just laid down the keel for their 800th steamer, which is on an average of eighteen steamers per annum, since the formation of the Company; nearly every berth is occupied in both yards.

Messrs. Irvine's Shipbuilding and Dry Dock Co., Ltd., Harbour Dockyard, continue to be very busy both on new and repair work, the capacity of this yard being taxed to the utmost. It is reported they are likely to secure an order for a small coasting passenger steamer, as they have recently constructed some very efficient steamers of this class, notably the s.s. *Stephen Furness* and the *Teessider*.

The Central Marine Engine Works of Messrs. W. Gray and Co. continue to be exceptionally busy in both the marine and specialty departments; indeed, the output is such that a record for this firm is likely to be established, having work on hand other than for the steamers building by them at the shipyards.

Messrs. Crosby, Magee & Co. are reported as having placed an order for a steamer to be built on the Isherwood principle of about 6,000 tons deadweight, through Messrs. A. H. Walker and Co., with Wearside builders, for early delivery.

Hartlepool.

Messrs. Irvine's Shipbuilding and Dry Dock Co., Ltd., Middleton Yard, continue to be very busy; good progress is being made with the large twin-screw meat boat for a Liverpool syndicate. They are reported as having secured an order to build a steamer for Messrs. Houlder Bros., Liverpool, a sister ship now being built for the same owners. They are also kept very busy with repair and dry dock work.

Messrs. Richardsons, Westgarth & Co., Ltd., still continue to be very busy in every department. They are reported as having secured the contract to supply the engines and boilers for the Houlder Bros.' steamer to be built by Messrs. Irvine's Shipbuilding and Dry Dock Co., Ltd., and which will be a duplicate set now on order for the same firm. They have also secured several contracts for condensing plants, all of which will be on the "Contraflo" system, which is gaining ground daily over the ordinary systems. They are now as busy as can be expected, except perhaps in the marine department, where night shift has been dispensed with.

The strike on the North Eastern Railway has interfered considerably with the various works in the locality, overtime being suspended and great inconvenience being experienced due to shortage of coal and iron.

THE HUMBER AND DISTRICT.

(From our Own Correspondent.)

Hull Marine Engineers' Association.—A party of members and friends of the Humber district branch, accompanied by the President, Mr. G. Grace, and Vice-president, Councillor D. Livingstone recently spent a most instructive and enjoyable day at Sheffield. The party visited the Brightside Works (covering 50 acres of ground) of Messrs. Cammell, Laird and Co. where the work carried on was of special interest to the party not only because of the magnitude of the concern, but much of what was seen was connected with marine practice, and yet represented a branch of engineering with which Hull is not familiar. After a careful inspection of the works the party proceeded to the King's Arms Hotel, where an excellent lunch was served. After luncheon a section of the party proceeded to the engineering works of Messrs. Lockwood & Carlisle, and were much impressed with the splendid conditions under which the employees worked, every consideration being given to the health and surroundings of the men.

A meeting of the members of the Marine Engineers' Association was held on the 17th August at the rooms Dock Street and a large number of members attended to welcome the general secretary, Mr. W. L. Marshall, from London, the Vice-president, Councillor Livingstone, being in the chair.

Earle's Shipbuilding and Engineering Co., Ltd., are keeping fairly busy with new and repairing work, and are building a large steamer for the Indian trade also two passenger steamers for the St. Petersburg trade, which will be fitted up with refrigerating appliances for carrying Siberian butter, fowls etc. The vessel will have a fair sea speed. It is also rumoured that the Company has secured an order for ferry steamers from the Great Central Railway to ply on the Humber, carrying passengers between Hull and New Holland in connection with the train service. The s.s. *Harrogate* has just run her trial trip, and has been handed over to her owners, Wilson and North Eastern Railway Co. She has been built for the Hull and Antwerp trade and is fitted to carry horses and fruit.

Hull Central Dry Dock and Engineering Works, Ltd., have been fairly busy in their own dry dock, and have had to engage the Alexandra Dry Dock. The following steamers have been docked :—s.s. *Shad Thames*, s.s. *Silver Wings*, s.s. *William Middleton*, s.s. *Silverdale*, s.s. *Khorazau*, s.s. *Deddington*, s.s. *Southville*, s.s. *Antonie*, s.s. *Skanduborg*, s.s. *Kirkham Abbey*. Several of these steamers have been docked for Lloyd's survey. Work on the following steamers has also been done—*Duke of Clarence*, *Arlington*, *Olympic*, *Asiatic*, *Pontypridd*, *Paul Pary*, *Russland*, *Lloyd* and *Hackwood*. The s.s. *Rerdan* is now in the Company's graving dock. The general manager of the Company Mr. Hall has been unwell for some time but it is pleasing to note he is now on a fair way to recovery.

Messrs. Stewart & Craig, engineers and boilermakers, have had repair work on the following steamers s.s. *Lucia*, *Vascania*, *Elbo*, *Jagersborg*, and also the following sailing ships—*General de Sonis* and *Elvira*. Enquiries as to graving dock work have been received from several steamship companies.

Messrs. Amos & Smith, engineers and boilermakers are only moderately employed on repair work, but have several new vessels fitting out with new machinery etc. The workshop is running night and day to deal with new orders coming in. The branch shop at Alexandra Dock has been fairly well employed in graving-dock work on several steamers of the Wilson Line.

Messrs. Cooper & Co., Ltd., engineers and boilermakers, have been fairly busy with repair work on several docks both afloat and graving dock work. The moulding and boiler shops have been fairly busy. This Company's graving dock in the old harbour has been well booked up with coasting steamers and are still fully employed ; the branch shop at Alexandra Dock has also been kept busy with repairs, etc.

Messrs. C. D. Holmes, Ltd., engineers and boilermakers.—These works are fully engaged in building trawlers and drifters machinery for local and other owners. The firm's patent compound winches and auxiliary machinery for steamers are finding great favour amongst the trawler owners ; they are very powerful and well-finished winches. The branch shop at Alexandra Dock has had a good number of ships in for overhauling and opening out for Lloyd's survey.

Fish Dock Engineering Shops are all at top pressure opening out boilers and machinery, slipping trawlers for Hull, sighting and drawing tail shafts, etc., for Lloyd's annual survey.

Messrs. Cochrane & Sons, shipbuilders Selby are very busy building trawlers and drifters for Grimsby and Hull and other owners. They have had a little trouble with the platers but all are at work again. Several trawlers were launched last month and orders are still being booked but in many cases delivery cannot be guaranteed at a stated period.

Messrs. North-East Coast Engineering Works, Ltd., have been fairly busy with the following s.s. *Lutkhad* dry docked and new rolling chocks and propeller fitted, rudder examined and lined up and machinery overhauled. S.s. *Lear*, *Satrell*, *Kasima*, *Grip* and *Fea* all have had general repairs executed. A number of steamers coming to this port are booked for graving dock and repairs.

Messrs. Brigham & Corrie, engineers and boilermakers, have leased a graving dock in Old Harbour for small coasting steamers, tug boats, etc., and have built a large fitting and machine shop. This firm is now prepared to execute repairs on all classes of steamers of large and small tonnage. They have also a machine shop on St. Andrew's Dock. This establishment is a well-known one on the Tyne, and they are expecting a good share of patronage, both from local and Tyneside owners when their steamers come to the Humber ports.

SOUTH OF ENGLAND AND ISLE OF WIGHT.

(From our Own Correspondent.)

Messrs. J. Samuel White & Co., East Cowes, Isle of Wight. H.M.S. *Ferret* left the builders' yard last month, and proceeded to Sheerness to undergo steam trials. The first of the Revenue Cruisers for the Cuban Government has been launched and is receiving her machinery. Several additional orders have been booked and the boatshop continues busy.

Labour Matters.—The Southampton branch of the Seamen and Firemen's Union have taken action with regard to the conditions of labour and rates of pay under which the sailors and firemen employed by the Isle of Wight and South of England R.M.S.P. Co carry on their duties and have been successful in getting the Company to grant several concessions to their employees. Overtime for seamen and firemen will now count from 8.30 p.m. instead of from 10 p.m. as previously, and firemen in receipt of union rates will get an extra shilling for Sunday work. Seamen will get an advance of 1s. 6d. per week. Shore firemen now in receipt of 27s. will get 28s. 6d. per week. The coalies, who were recently on strike and returned to work, have still some outstanding grievances. When the men resumed work it was understood that the question of wages should be considered by a joint committee at an early date. Nothing has been done, and the men gave notice that they would cease work unless something was immediately done in the matter. As a result the coal porters were given an advance of a farthing per ton, but trimmers' wages were not increased, whereupon they threatened to strike. They were, however, prevailed upon to continue with their work pending a satisfactory result of negotiations proceeding in London. The trimmers' demand an increase of 1d. per ton.

Last month two of the steamers engaged in the new fruit service between the West Indies and Southampton were the cause of friction in connection with the Chinese seamen who constituted the crew. The local branch of the Seamen's Union issued a notice to the effect that unless the Chinamen were sent away they would not discharge the cargo of bananas. After a hurried consultation the Chinese crew were entrained

[illegible] London [illegible] which the cargo consisting of [illegible] was discharged. The trial was a very [illegible] and the new service promises to be a success.

New South American Service.—As was intimated under the heading "The Birth of the Mail Line" in last month's issue, a reconstruction of the firm of Messrs. Lamport and Holt had been effected, whereby three gentlemen associated with the R.M.S.P. Co. became directors of the new company. In this connection a new South American service which interests will be in the hands of the R.M.S.P. Co., will be inaugurated. The new vessel building for this service will be dispatched from Liverpool on the 5th of each month and will proceed to Rio de Janeiro, Monte Video and Buenos Ayres, calling at Vigo and Lisbon. They will depart on the 5th of the month from Buenos Ayres calling at Rio de Janeiro, Madeira, Lisbon, Vigo and on to Southampton where passengers will be landed and afterwards they will proceed to Liverpool. This service will be maintained by the "Vandyck" [illegible] three in number of the *Vandyck* [illegible] and [illegible] each of 12,000 tons. These vessels are being constructed by Messrs. Workman, Clark & Co. Belfast, and the first named is nearly ready for delivery and will sail from Liverpool on the 5th of October.

New Cape Steamers.—The *Gloucester Castle*, of the Union Castle Line, sailed on her maiden voyage from Southampton at the end of last month. She is one of three sister vessels intended for the Company's intermediate service. The vessels are about 500 ft. long and 8000 tons gross each. The sisters, *Gestirid* and *Gaiaan Castles* are nearing completion and will shortly take up their positions in the Company's services.

Messrs. Simpson, Strickland & Co., Dartmouth, S. Devon.—This firm keep fairly busy with new and repair work. They have recently received an order for a 42 ft. steel launch which is to be fitted with compound engines and water-tube boiler. The launch is for foreign account. A handsome 42 ft. mahogany launch fitted with triple engines and water-tube boiler, and having a speed of 12 miles per hour, has just been delivered to Miss Emily Windsor, of Dartmouth. A 23-ft. steel launch is on order for foreign account, to be fitted with one of the firm's 8 B.H.P. petrol motors. A 30-ft. launch for a mail boat is finished, awaiting delivery, whilst several steam and motor-boats are in hand to the order of the Admiralty. The motor-yacht *Cachelot* was hauled up last month and will be lengthened, the forward part of the boat being entirely rebuilt.

THAMES.

(From our Own Correspondent.)

Dock Strike. The labour dispute has caused an eventful time. Ships have been held up, and the trade of the port paralyzed, and other trades joining in sympathy, the country generally may be described as having been in a condition such as has not been known in the present generation. The docks most concerned were the Albert, Victoria, Tilbury, Surrey and Commerical. Arbitration has been resorted to and Sir Albert Rollit appointed to conduct the Court. The award was generally in favour of the men, and the Port of London Authority have already increased their charges in consequence to pay for the extra handling costs. In connection with the dispute a meeting of vast dimensions has been held in Trafalgar Square, the largest since 1889. The dockers' dispute has, however, necessarily affected other trades—carmen, lightermen—and hence the general recent dislocation of trade. The docks being an organized piece of machinery, the whole system gets thrown out of gear when once a start has been made, and goods are stored at the docks at such an advantage in cool stores that an upheaval such as we have recently witnessed prevents deliveries of food supplies. A shortage ensues, in fact. The difficulties of settlement have been partly caused by the Short Sea Traders, who did not consider themselves bound by the award. The Port of London Authority also decided to put returned strikers on six months' probation, which decision created further discontent, and there have been minor troubles. The lines that have been chiefly affected are the Shaw, Savill & Albion, the Atlantic Transport, the British India and the P. & O. Co. The latter Company have used Antwerp as a port as they were unable to unload in the Thames, the endeavour being to get the goods across to an east-coast port and thence to London by rail. Such cumbersome methods mean great losses to the shipping community which must be detrimental to the trade of the port and the community at large but it is to be hoped the long settlement is now actually reached.

London Dock Improvements.—Before the strike assumed the proportions it did the Port of London Authority had decided on their improvements to be taken in hand at early date. These improvements will be found referred to in *The Marine Engineer and Naval Architect* of March this year, and it will be seen therefrom the vast nature of the proposals the Authority are undertaking and the far reaching character they will have on the port as a whole.

New Vessel. The Aberdeen Line have in the *Demosthenes* a fine addition to their fleet. She is 11,300 tons, and was built at Messrs. Harland & Wolff's yard. Lying in the Royal Albert Dock, she was booked to sail for Australia on the 31st ult., and her list included a full complement of passengers. Every device seems to have been employed to make the vessel up-to-date in every way, and only first and third-class passengers are carried.

The "Worcester" Training Ship.—A visit was paid recently by the Lord Mayor to this vessel for the annual prize distribution. At the function Sir Thos. Sutherland was present, also Admiral Sir E. Freemantle, T. L. Devitt, Esq., and many more well-known people interested in seafaring. Sir Thos. Sutherland presided and the Lord Mayor presented the prizes and made an encouraging speech to the cadets. The visitors were conveyed to and fro on one of the "Belle" steamers in the beautiful weather that has prevailed for so long a time.

MERSEY AND MANCHESTER SHIP CANAL.

(From our Own Correspondent.)

Messrs. Cammell, Laird & Co.—Two launches have taken place at this yard during the past month, *viz.*, H.M. Destroyer *Lapwing* on July 29th, her sister vessel the *Lizard* being just ready to take the water; the second launch being H.M. Tender to depot ship *Alecto*, launched on August 29th. The sister ship to the latter is now finishing in the wet basin prior to going on trial. The cruiser *Melbourne* is now well advanced, as is also the super-Dreadnought, while the floating dock is revealing its huge dimensions. The four Destroyers for the Argentine are now finishing trials, and it is expected will shortly be handed over to the Government. A large tug for the Port of London Authority is well in frame, while various barges are completing for foreign owners. According to a statement by Mr. R. R. Bevis, who has just returned from Canada, it is possible that Messrs. Cammell, Laird and Co. may secure the contract for the Canadian Navy. In this event it is rumoured that a shipbuilding plant will be laid down at St. John, New Brunswick. It is also rumoured that this firm have recently secured a large dredger contract for continental owners. The large wet dock is at the time of writing filled with tugs and other craft laid up owing to the dispute. The large steamer *Rowanmore* is in dry dock, the tug *Peacock* has also been in; other work is also on hand as soon as towing facilities are available.

Messrs. H. & C. Grayson.—Work has been held back recently due to the disturbances in the various yards of this usually busy firm. An event of additional importance was the handing over of the steamer *Poderoso* to her owners, the P.S.N. Co. after a successful trial last month. This vessel is a combined tug, salvage and water boat, built to Lloyd's requirements. She will be used for salvage work, also for laying of heavy mooring cables in deep waters; for the latter purpose a powerful combined winch and windlass has been fitted forward, controlled from the bridge. A salvage pump has been fitted on deck capable of delivering 160 tons of water per hour, while a large warping winch is fitted aft. One of the holds is fitted to carry water, while large bunker capacity is available for making long voyages along the Pacific Coast, where the vessel will be located. Large repairs

[illegible]

The New Royal Liver Building.—[illegible] There are also two goods lifts, all being fitted with all the latest safety and other appliances.

The Isherwood System.—[illegible] Isherwood.

The Manchester Ship Canal.—The half-yearly meeting of [illegible] the chairman remarked that the strike had not affected the [illegible] there being a slight increase in working expenses [illegible] two years.

[illegible] 26th, great interest being shown in this vessel as being the [illegible] built. The principal dimensions are—length 547 ft., breadth [illegible] in New Zealand in thirty-six days without change of bottom. Two sets of quadruple-expansion engines will develop [illegible]

Death of Well-known Shipowner.—The death took place [illegible] steam.

The Cunard Line.—[illegible]

NORTH-WEST OF ENGLAND.

[illegible]

A Turkish Battleship.—Messrs. Vickers, Ltd., have booked [illegible] ment, and a similar order has gone to the Elswick firm. This [illegible] British battleships which have recently [illegible]

Chilian "Dreadnoughts."—It is officially stated that the [illegible]

A Russian "Dreadnought."—[illegible]

A Big Programme of Work.—[illegible] when it is remembered they have already in hand the British [illegible] a week is paid in wages to the men employed by the Vickers' firm.

H.M.S. "Dartmouth."—[illegible] cruiser have taken place during the month on the Clyde, [illegible]

A Small Order.—[illegible] an order for a tug boat with the Vickers' firm to be delivered [illegible] the Canadian Government, has arrived at Montreal. [illegible]

Submarines.—Although little is said now-a-days about [illegible]

Brisk Engineering.—[illegible] build the engines for both the Barrow and the Elswick ships. The local builders are also engining the Brazilian battleship [illegible] and requires a deal of work to keep it going in all its [illegible]

The Hæmatite Trade.—[illegible]

Shipping.—The shipping trade is exceedingly quiet and further shrinkages in exports of iron and steel are reported.

BELFAST.

[illegible]

Messrs. Harland & Wolff.—All the berths of the Queen's [illegible]

are being rebuilt. Rapid progress is being made with the fitting out of the *Titanic*. Early in September the latest addition to the Belfast Steamship Company's fleet of high-class cross-Channel steamers will be launched from the north end of the Queen's Island. She is to be named *Patriotic*, and will have more extensive passenger accommodation than any other vessel running between Belfast and English or Scotch ports.

Messrs. Workman, Clark & Co.—This firm is also fully booked up with orders which will keep both yards in full swing for a long period. On the first of August they launched a further addition to the large fleet of fruit steamers which they have from time to time turned out. The vessel referred to is the *Peralta*, built to the order of the Tropical Fruit Steamship Co. She is a vessel of 5000 gross tonnage, a sister ship of *La Sonora* which is being completed for sea. A similar steamer named *Sixaola*, building for the same owners, will shortly be launched from the south yard. The fitting out of Messrs. Lamport & Holt's new twin-screw steamer *Vandyck* is being brought to completion. The *Vandyck* is a vessel of 12,000 gross tonnage, and is the first of three liners ordered by the same owners from Messrs. Workman, Clark & Co. for the Company's new monthly passenger and chilled meat service between Liverpool and Buenos Ayres. The bottom damage repairs to s.s. *Egra* (British India Co.), which went ashore after completion of her speed trials, have been carried out, and the vessel has sailed from Belfast.

Messrs. MacColl & Co. have lately had a considerable run of repair work. At the present time they have a French sailing ship and three coasting steamers in hand for dry-docking and repairs.

LAUNCHES AND TRIAL TRIPS.

LAUNCHES English.

Cherbury.—On June 15th, there was launched from the shipbuilding yard of Messrs. John Blumer & Co., North Dock, Sunderland, the screw steamer *Cherbury*, for Messrs. Charlton & Thompson, of Sunderland. She is of the single deck type, with poop, bridge and forecastle, perfectly clear holds, and is specially adapted to carry a large deadweight on a light draught. Water ballast is provided in the double bottom and also in the fore and after peak tanks. The accommodation for captain, officers and engineers is arranged amidships. The discharging gear is thoroughly up to date in every respect. Engines will be fitted by Messrs. John Dickinson & Sons, Ltd., and the winches and steering gear by Messrs. John Lynn and Co., Ltd., of Pallion.

Volhynia.—On June 29th, there was launched from the yard of Messrs. R. Williamson & Son, Workington, a steel screw steamer of the following dimensions: Length, 175 ft.; breadth, 27 ft.; and depth, 13 ft. 4 in. She is designed to carry about 750 tons deadweight on Lloyd's freeboard. The vessel has been built to the highest class at Lloyd's, and will be propelled by triple expansion engines, having cylinders 14, 24 and 40 in. in diameter by 27 in. stroke, steam being supplied by a cylindrical steel boiler 14 ft. 6 in. in diameter by 10 ft. long, working at a pressure of 180 lbs.

Harrogate.—On June 29th, the handsomely modelled single screw steamer *Harrogate*, built to the order of Messrs. Wilson's and North-Eastern Railway Shipping Co., Ltd., was successfully launched from the yard of Earle's Shipbuilding and Engineering Co., Ltd., Hull. This vessel is intended for the Hull and Hamburg trade, and is specially adapted for the carriage of cargo and horses, and will run in conjunction with the new fast steamers *Hull, York,* and *Darlington,* thus ensuring a quick service between the two ports. The principal dimensions of this steamer are: Length, 255 ft.; breadth, 36 ft. moulded; depth, 17 ft. 4 in. moulded. She has been constructed of steel throughout to Lloyd's 100 A1 class and to Board of Trade latest requirements. The vessel is of the single deck type with long poop and forecastle, saloon and boat decks extending over the accommodation amidships; this accommodation consists of a large steel deck house in which are berthed the officers, engineers, etc., the captain's house being situated on the saloon deck adjoining the navigating bridge. The crew's quarters are in the forecastle. She has two steel pole masts, each arranged to take four large steel derricks for the speedy handling of cargo, these derricks being capable of lifting 3, 7, and 12 tons each, the whole of the derricks being worked by powerful steam winches of the most up-to-date description, and on the forecastle an efficient steam windlass by Messrs. Clarke, Chapman & Co. is fitted. The steering engine is placed in the poop aft, and is worked by the telemotor system from the navigating bridge, and hand screw gear on poop deck, both of which have been supplied by Messrs. Amos & Smith, Hull. The ship will be fitted up with electric light and bell installation, the saloon, officers' and engineers' living rooms are all heated by approved steam radiators. All the work throughout the vessel is of the very best description, with latest improvements. The machinery, which is being constructed by Earle's Company, consists of a set of triple expansion engines having cylinders 20½ in., 34 in., and 56 in., by 39 in. stroke, supplied with steam at 180 lbs. pressure, by two large cylindrical boilers, the whole of the machinery being of the best quality and finish to Lloyd's and Board of Trade requirements.

Hopper Barge for North-Eastern Railway Company.—On July 5th, the Blyth Shipbuilding and Dry Docks' Co., Limited, launched from their shipbuilding and graving dock works a 600-ton steam hopper barge built to the order of the North-Eastern Railway Co., which has been specially constructed in connection with their various docks and harbours. Powerful propelling machinery will be supplied by Messrs. Amos and Smith, of Hull. This steam barge is the first of two which the Blyth Shipbuilding and Dry Docks Co., Ltd., are constructing at present for the railway company, and has been built to class 100 A1 Lloyd's, to the specification of T. M. Newell, Esq., chief dock engineer to the N.E.R.

Atna.—On July 6th, Messrs. Wm. Doxford & Sons, Ltd., launched from their yard at Pallion, Sunderland, a single decked steamer, the *Atna*, built to the order of Wilhelm Wilhelmsen, Esq., of Tonsberg. The dimensions of the vessel are: Length, 403 ft.; breadth, 53 ft. 6 in.; moulded depth, 28 ft. 10 in.; and she will have a deadweight capacity of about 8,700 tons on a moderate draft. The engines and boilers will be supplied by Messrs. Doxford. The vessel has been built to the classification of British Corporation and Norwegian Veritas.

Westoe.—On July 11th, there was launched from Messrs. Wood, Skinner & Co.'s shipyard, Bill Quay-on-Tyne, the new ferryboat *Westoe*, which has been built for the Tyne Improvement Commission. The vessel is of the following dimensions: Length, 115 ft.; beam 30 ft.; breadth, 43 ft.; and mean depth moulded 11¼ ft. It is intended for the vehicular traffic between North and South Shields. Two large gangways are fitted on either side, and the vessel generally is constructed to cope with the heaviest vehicles. A new feature is that, instead of the present type of paddle-boats, the *Westoe* will be fitted with twin screw triple expansion engines.

Imataka.—On July 12th, Sir Raylton Dixon & Co., Ltd., launched from their Cleveland Dockyard at Middlesbrough the fine steel screw steamer *Imataka*, specially constructed to the order of Messrs. Booker Bros., McConnell & Co., Limited, of Liverpool, London and Demerara, for their line of steamers running regularly from Liverpool to Demerara direct. The vessel has been built under special survey to Lloyd's 100 A1 class, and is of the single deck, shelter deck type, her principal dimensions being 297 ft. by 42 ft. by 19 ft. 6 in. moulded. She has a large steel deckhouse on shelter deck with cabins amidships for 12 saloon passengers and the ship's officers. The captain's room is on the top of the saloon with a smoke room aft thereof, and there is a chartroom and flying bridge above same; while the crew will be berthed in the forecastle. The vessel will have four holds and four hatches, and is equipped with 10 derricks, five steam winches, steam wind lass, hand and steam steering gear with all the latest and most modern arrangements for the safe and rapid handling of cargo. She is fitted throughout with electric light and has a large refrigerated house in shelter 'tween decks for carrying fresh provisions, while her Nos. 2 and 3 holds are insulated for the carriage of frozen meat. The vessel is to be fitted by Messrs. Blair & Co., Ltd., of Stockton-on-

Tees, with triple expansion engines, having cylinders 23 in., 37½ in., and 61½ in., by 36 in. stroke, supplied with steam from two large single ended boilers working at 180 lbs. pressure.

Normanby.—On July 12th, Messrs. William Gray and Co., Ltd., launched the handsome steel screw steamer *Normanby*, which they have built for the London and Northern Steamship Company, Ltd., Messrs. Pyman Bros., London, managers. The vessel is of the shelter deck type, and will take the highest class in Lloyd's Register. Her dimensions are: Length overall, 408 ft. 6 in.; breadth, 53 ft. 9 in., and depth, 25 ft. 3½ in. The saloon, state rooms, captain's, officers' and engineers' rooms, etc., are in houses on the bridge deck, and the crew's accommodation forward. The hull is built with deep bulb angle frames dispensing with hold beams and leaving large clear holds, cellular double bottom and fore and aft peak ballast tanks, ten steam winches, derrick tables and outriggers, double derricks at each hatch, steam steering gear amidships, hand screw gear aft, patent direct steam windlass, fresh water distiller, steel grain divisions, stockless anchors, telescopic masts, boats on deck overhead, and all requirements for a first-class cargo steamer. Triple expansion engines are being supplied by the Central Marine Engine Works of the builders, having cylinders 26 in., 42 in., and 70 in. diameter, with a piston stroke of 48 in., and three large steel boilers for a working pressure of 180 lbs. per square inch.

Japanese Prince.—On July 12th, the *Japanese Prince*, the latest addition to the Prince Line fleet of steamers, was successfully launched from the shipyard of Messrs. Doxford & Sons, Ltd., Sunderland. The vessel has been built with complete shelter deck and 'tween decks, and her dimensions are: Length, 410 ft.; breadth, 54 ft. 4 in.; and moulded depth 28 ft. 1 in. Her gross tonnage is 4,880, and deadweight capacity 8,100 tons. The engines and boilers will be supplied by Messrs. Doxford. The vessel has been built to the classification of Lloyd's 100 A1, and while under construction the hull and engines have been under the supervision of Messrs. J. T. Trail and J. G. Pringle, superintendent for the Prince Line.

City of Lincoln.—On July 13th, there was launched from the Jarrow shipyard of Palmer's Shipbuilding and Iron Co., Ltd., the handsomely modelled steel screw steamer *City of Lincoln*, built to the order of the Ellerman Lines, Limited, of London and Liverpool. The vessel is over 420 feet long, and has been built to the highest class in Lloyd's Register. She has complete 'tween decks, with long bridge, poop, and forecastle, and is fitted with longitudinal girders under the beams and wide spaced hold pillars, giving clear holds for cargo. Water ballast is provided for in cellular double bottom all fore and aft and in deep tank and aft peak. The vessel is lighted by electricity throughout, and is fitted with a very complete system of derricks with steam winches for rapid working of cargo. She is to be fitted with triple expansion engines, also manufactured by Palmer's Company, which will give her a speed of between 11 and 12 knots.

Brisbane.—On July 14th, Messrs. Swan, Hunter and Wigham Richardson, Ltd., launched at Newcastle-on-Tyne a fine steel screw steamer which they are building for the German-Australian Line, of Hamburg, for that company's service between Europe and Australian ports. The vessel is 444 ft. in length by 57 ft. beam, and is being constructed to attain the highest class in Lloyd's Register. She will carry 9,300 tons deadweight, and her propelling machinery will consist of a set of powerful triple-expansion engines, supplied with steam by four large single-ended boilers, all of which are being constructed at the Neptune Works. The auxiliary machinery for working the ship herself, and for loading and discharging her cargo, is of the most modern and complete type. The steamer is also intended to receive an installation of wireless telegraphy. Capt. H. Schütt takes command of the vessel when completed.

William Gray.—There has been launched at South Shields a powerful twin screw tug of the following dimensions: Length, 95 ft.; breadth moulded, 24 ft.; and depth moulded, 12 ft. 6 in. She has been built to Lloyd's 100 A1 class for towing purposes. The deck equipment is of the latest type, including steam windlass and steam steering gear. The propelling machinery consists of a set of twin screw compound surface-condensing engines, capable of developing 800 I.H.P. Steam is supplied by two large multitubular boilers having a working pressure of 140 lbs. There is also fitted in the engine room a powerful centrifugal salvage pump, and a special vertical steam fire pump capable of discharging 500 gallons per minute. The tug has been built to the order of the North Eastern Railway Co., and is intended for service at Hartlepool.

Glenbridge.—On July 25th, Messrs. Irvine's Shipbuilding and Dry Dock Co., Ltd., launched from their harbour dock yard, West Hartlepool, the steel screw steamer *Glenbridge*, built to the order of Messrs. Milburn, Landy & Co., of Whitby and West Hartlepool. The *Glenbridge* is 300 ft. in length by 51 ft. 7 in. beam extreme by 29 ft. 2 in. depth, moulded, having a deadweight capacity of 6,000 tons. The vessel is of the single deck type with poop, bridge and forecastle, and is built to Lloyd's highest class. Cellular double bottom is fitted throughout, and she has large fore and after-peak tanks for water ballast. The vessel is constructed with deep frames and longitudinal stringers, giving clear holds for the stowage of bulky cargoes, and is divided into seven water tight compartments by means of six water-tight bulkheads. Wood grain divisions are fitted throughout the holds, according to the latest Board of Trade requirements. Four extra large hatches are provided, with eight powerful steam winches worked from a multitubular donkey boiler, and all the latest improvements are included for the rapid loading and discharging of cargo. A powerful quick-warping steam windlass is fitted forward, and steam-steering gear amidships, with hand-screw gear aft. The captain, officers and engineers will be berthed in houses amidships, and the crew and firemen in the forecastle. The lighting, ventilating and sanitary arrangements have received special attention, the most improved methods being adopted throughout. Triple expansion engines will be supplied and fitted by Messrs. Richardsons, Westgarth & Co., Ltd., Hartlepool, having cylinders 25 in., 40 in. and 67 in. by 45 in. stroke, with two large single ended boilers working at a pressure of 180 lbs. A "Contralto" condenser of the latest type, together with patent furnaces, evaporator, etc., will be fitted. Messrs. Wailes, Dove & Co.'s "Bitumastic" enamel has been applied to the bunkers, engine and boiler room tanks, and their "Bitumastic" covering to the tank tops.

Sangstad.—On July 25th, Messrs. Robert Thompson and Sons, Ltd., launched from their Southwick yard a single-deck steamer built to the order of Messrs. A. L. Klaveness & Co., of Lysaker, Norway, and the fourth vessel they have built for these owners. Her principal dimensions are: Length between perpendiculars 290 ft., breadth 44 ft. 6 in., and depth moulded 22 ft. 3 in. She is built to take the highest class in Det Norske Veritas, and is constructed on the deep frame principle with one deck, leaving the holds clear of all obstructions. The erections consist of poop 25 ft., bridge 54 ft., both available for cargo if required, and topgallant forecastle for the accommodation of petty officers and crew. Large and spacious deck houses are arranged on top of the bridge deck for the captain, officers and engineers, the saloon being fitted up in polished oak. There are four large hatchways with double derricks fitted to each, one hatch having a derrick with gear capable of lifting 20 tons. There are six powerful steam winches, and a large multitubular donkey boiler of ample capacity for the supply of steam to the deck machinery, steam windlass and steam-steering gear. The engines by Messrs. The North Eastern Marine Engineering Co., Ltd., Sunderland, have cylinders 21½ in., 36 in. and 59 in., with a stroke of 39 in., steam being supplied by large boilers working at a pressure of 180 lbs. per square inch.

Eskwood.—On July 25th, Messrs. W. Harkess & Son, Ltd., launched the steel screw steamer *Eskwood* from their yard at Middlesbrough. This vessel has been built to the order of Messrs. The Meteor Steamship Co., Ltd., of Middlesbrough, Messrs. R. A. Constantine & Donking, managers, and is specially designed for their coasting trade. Her dimensions are 190 ft. by 29 ft. by 13 ft. moulded; she is built to Lloyd's highest class and equipped with a very up-to-date installation of deck machinery, including double winches at each hatchway, also double derricks and steel masts, enabling her to handle every description of cargo with the utmost despatch. She has very large hatchways and large cubical capacity to adapt her specially for the general cargo

[illegible] and [illegible] tons on a very light draught of water. The engines are being fitted on board by Messrs. [illegible] Ltd., of Stockton-on-Tees, and are intended to give a speed of [illegible] knots loaded. The [illegible] and with sundry improvements of the s.s. *Levenswood*, which vessel was delivered to the owners [illegible] completing a very satisfactory trial trip.

Trevalgan.—On July [illegible]th there was launched from the shipbuilding yard of Messrs. John Readhead & Sons, Ltd., [illegible] a steel screw steamer built to [illegible] of Messrs. Edward Hain & Son, St. Ives, Cornwall, and named the *Trevalgan*. The vessel is of the improved single deck type to Lloyd's highest class, and under their special survey, having poop, extra long bridge and topgallant forecastle, with deep girder framing, and having cellular double bottom all fore and aft, with large after-peak tank for water ballast. The outfit of the ship is very complete for general and grain trades, with shifting boards all fore and aft, and trunk feeders as hatchways. A full equipment of steam winches and derricks is fitted for the rapid loading and discharging of cargoes. She will carry a deadweight cargo of 7,[illegible] tons on a light draught of water. The vessel will be fitted with triple-expansion engines, also constructed by Messrs. John Readhead & Sons, Ltd., having cylinders 26 in., 42 in. and 69 in., with 48 in. stroke, supplied with steam from two large steel boilers working at a pressure of 180 lbs. per square inch. This is the fifty-sixth vessel built for the above firm by Messrs. John Readhead & Sons, Ltd.

Thornhill.—On July 26th, Messrs. Short Brothers, Ltd., launched from their yard at Pallion, Sunderland, a steel screw steamer to the order of Messrs. The Taylor & Sanderson Steam Shipping Co., Ltd., of Sunderland, making the twenty-eighth vessel built for this firm and representing a gross tonnage of 7,[illegible] tons and a cargo capacity of 125,850 tons. She will take Lloyd's highest class and is built on the Isherwood patent system with poop, cargo bridge and forecastle and one deck laid. Her leading dimensions are—length 368 ft., beam 51 ft. and depth moulded 26 ft. 3½ in., and she is designed to carry a cargo of 6,600 tons on a light draught. Water ballast is provided throughout the double bottom, which is carried out to the sides of ship and in fore and after peaks. Five extra large hatchways are fitted and as there are no pillars the holds are well suited to carry large pieces of machinery. The vessel has centre line steel bulkhead, between hatches and six water-tight bulkheads. Chart house and captain's room, with wheelhouse above and two flying bridges, are on fore end of bridge deck. Electric light is provided throughout the ship and steam heating to accommodation. For loading and discharging double derricks are provided to each hatch, eight of these being worked from derrick tables on masts, with cross trees above and the remaining two from specially designed posts at cross bunker hatch. Nine steam winches, steam-steering gear placed in engine-room, worked from standards on flying bridge, and wheelhouse and connected by rods and chains to rudder head. Steam windlass and steam ash hoist will be fitted, driven from a large multitubular donkey boiler in engine casing and exhausting to a winch condenser. The propelling machinery will be installed by Messrs. George Clark, Ltd., of Sunderland, and consist of triple-expansion engines with cylinders 25 in., 41 in. and 67 in. diameter and a stroke of 45 in., taking steam from two large multitubular boilers of 180 lbs. pressure.

Peebles.—On July 26th, the Northumberland Shipbuilding Co., Ltd., launched from their yard at Howden-on-Tyne the finely-moulded screw steamer *Peebles*, built to the order of Messrs. B. J. Sutherland & Co., Ltd., Newcastle-on-Tyne. The vessel is 390 ft. long by 49 ft. by 29 ft. 4 in. deep, and has been built under special survey to the highest class at Lloyd's. She is fitted with long bridge, long poop and topgallant forecastle, the accommodation, which is very ample being placed in steel houses on the bridge deck. This steamer has been specially designed with a view to rapid loading and discharging of homogeneous cargoes, the hatchways being very long and wide and are arranged for grain carrying in bulk, a complete set of shifting boards being fitted throughout to latest Board of Trade requirements. Ample deck gear is provided, consisting of nine steam winches by Messrs. Clarke, Chapman & Co., Ltd., Gateshead-on-Tyne, and a large number of cargo derricks to ensure the expeditious handling of cargoes. The propelling machinery will be supplied by Messrs. Richardsons, Westgarth & Co., Ltd., Sunderland, consisting of engines with cylinders 28 in., 41 in., 69 in. by 48 in. stroke, three large steel boilers working at 180 lbs. pressure. The steamer will carry about 7,700 tons on a light draught and steam about 10 knots loaded at sea.

Sandfly.—On July 26th, Messrs. Swan, Hunter & Wigham Richardson, Ltd., successfully launched from their Wallsend shipyard the *Sandfly*, a 27 non-ocean-going torpedo-boat destroyer. The work of construction of the *Sandfly* is in an advanced stage so that she will be ready for steam trials at an early date. The Wallsend Shipway and Engineering Co. are constructing the propelling machinery, which consists of an arrangement of Parsons turbines driving three separate shafts. The three boilers of the *Sandfly* are of the water tube type, and the furnaces are fitted with an oil burning installation.

Michael Angelo and Lord Knollys.—On July 27th, there were launched from the yard of Messrs. Cochrane & Sons, Selby, two steel screw trawlers, the principal dimensions being 1[illegible] ft. 4 in. by [illegible] ft. by [illegible] ft. 9 in. moulded. The vessels have been built to the order of Messrs. Pickering & Haldane's Steam Trawling Co. and The Yorkshire Steam Fishing Co., of Hull, and will be replete with all the latest improvements for the fishing trade. Powerful triple-expansion engines will be fitted by Messrs. C. D. Holmes & Co., Ltd., of Hull.

LAUNCHES—Scotch.

Lady Bacon.—On July 25th, Messrs. Brown & Co., Greenock, launched the steamer *Lady Bacon*, which they have built for Messrs. John Deacon, Ltd., Liverpool. The vessel, which will be employed in the coasting trade, is 142 ft. in length, 24 ft. in breadth, and 10 ft. 10 in. in depth (moulded). Messrs. Gauldie, Gillespie & Co., Glasgow, will supply the machinery.

Baron Semphill.—On July 25th, Messrs. A. Rodger and Co., Glasgow, launched the steamer *Baron Semphill*, which they have built for Messrs. Hugh Hogarth & Sons, Ardrossan. The vessel, which is of the shelter-deck type, has been constructed to the highest class of the British Corporation. The steamer is 270 ft. in length, 40 ft. in breadth, and 19 ft. in depth (moulded), and has a deadweight carrying capacity of 3,200 tons. The machinery will be supplied by the builders. A Cochran (Annan) Donkey Boiler with Patent Seamless Furnace has been supplied and fitted.

Duchess of Norfolk.—On July 25th, Messrs. David and William Henderson & Co., Ltd., Partick, Glasgow, launched the handsomely modelled paddle steamer *Duchess of Norfolk*, which they have built for the London and South Western and London, Brighton and South Coast Railway Companies for their Portsmouth and Isle of Wight traffic. The dimensions of the vessel are: Length, 198 ft., breadth, 26 ft., and depth moulded 9 ft. She will be fitted throughout in the most up-to-date manner, the first-class accommodation, which is aft, being of the most complete character, while the second-class will have comfortable quarters forward. The machinery, which is also by the builders, is of the compound diagonal type, with cylinders 27 in. and 51 in. diameter, and a stroke of 54 in.; she has one doudle-ended multitubular boiler, working at a pressure of 130 lbs. This vessel is practically a duplicate of the *Duchess of Richmond*, built last year by Messrs. Henderson for the same owners.

Mont Cenis.—On July 26th, Messrs. Napier & Miller, Limited, launched from their yard at Old Kilpatrick, a span deck steamer of the following dimensions: Length, 365 ft.; breadth, 49 ft.; depth, 27 ft.; with a gross tonnage of about 4,000 tons, designed to carry fully 6,500 tons on 23 feet draught. The vessel has upper and main decks, long poop and topgallant forecastle, cellular double bottom, aft peak tank, large hatches and clear holds, nine steam winches, and has been built to the requirements of the Bureau Veritas for their highest class. Machinery is being supplied by Messrs. D. Rowan & Co., Glasgow, and consists of triple expansion engines, also two main boilers and a donkey boiler. The vessel has been built to the order of Messrs. La Société Générale de Transports Maritimes à Vapeur et Marseilles, through the intermediation of their agents, Messrs. H. E. Moss & Co., of Liverpool, London and Newcastle.

Balvenie On July 27th, there was launched at Greenock a motor [illegible] deadweight cargo steamer by Messrs. Paton & Hendry, Glasgow. The vessel, which has [illegible] resembles in the [illegible] which was launched for the same owners about [illegible] ago. The dimensions are 210 ft. in length between perpendiculars, 30 ft. 9 in. in breadth, and 14 ft. 6 in. in depth moulded. She will have triple expansion engines, with cylinders, 17 in., 27 in., and 44 in. respectively, with a stroke of [illegible] in. The vessel, which will be employed in the general carrying trade, is the last of an order of four vessels to the same owners.

Strathderry and Strathgeldie On July 28th, two new steam trawlers built to the order of the Aberdeen Steam Trawling and Fishing Co., were launched by Messrs. Hall, Russell & Co., Aberdeen. They were named respectively *Strathderry* and *Strathgeldie*. Their dimensions are length, [illegible] ft., breadth, 21 ft. [illegible] in., and depth, 12 ft. 8 in. Triple expansion engines are being supplied by the builders.

Wirral On July 28th, Messrs. Russell & Co., Port Glasgow, launched the steamer *Wirral*, which they have built for Messrs. John Holt & Co., Liverpool. The dimensions of the vessel are: Length, 385 ft., breadth, 49 ft. 8 in., depth moulded, 28 ft. [illegible] in. The tonnage is 4,[illegible] tons gross. Messrs. David Rowan & Co., Glasgow, are supplying the machinery. Messrs. Matthew Keppie and Son, Ltd., have the contract to erect all the [illegible] and steel work, with their patent [illegible] in position.

Hind. On July 28th, there was launched at Glasgow the destroyer *Hind* for the British Navy. The vessel is one of eight in course of construction in Clyde yards.

Berna On Aug. 11th, there was launched at Port Glasgow the steel paddle steamer *Berna* for the Compania Argentina de Navegacion (Nicolas Mihanovich, Ltd.), Liverpool. The vessel, which is intended for passenger service on the Rivers Plate and Parana, is 275 ft. in length over all, 54 ft. in breadth over paddle boxes, 27 ft. in depth to bottom of hold, and of about 1,700 tons gross. Triple expansion engines will be supplied.

Guildford Castle On August 11th, the new [illegible] was launched at Whiteinch, for the Union Castle Steamship Co. The *Guildford Castle* is a sister ship to the *Galway Castle*, which has just been completed by the Fairfield Company, and the *Galway Castle*, which was launched at Belfast in April last. She is also similar in nearly every respect to the *Garth Castle*, built on the Clyde last year, for the same owners. The [illegible] is intended for the Union Castle Line's intermediate South African service. She is a twin screw steamer of about [illegible] tons gross, 400 ft. in length, 54 ft. 3 in. in breadth, and 33 ft. 6 in. in depth. She will have accommodation of the best type for a large number of first, second, and third class passengers.

Anchoria On August 15th, there was launched from the yard of Messrs. Alex. Stephen & Sons, Ltd., Linthouse, the first of two large steamers they have on order for the Indian Service of the Anchor Line (Henderson Bros., Limited). The vessel has been constructed to the highest requirements of the British Corporation, and her dimensions are: 420 ft. by 53 ft. by 33 ft. In addition to having a large cargo carrying capacity, accommodation has been provided for a number of passengers. Her equipment for dealing with large [illegible] depth, and at different draughts. The propelling machinery, which has also been provided by the builders, consists of triple expansion engines having cylinders 25 in., 41 in., and [illegible] in., by 54 in. stroke, and three large double ended boilers, with a full equipment of auxiliary machinery.

Bedlington On August 15th, Messrs. Archd. McMillan and Son, Ltd., Dumbarton, launched the steel cargo steamer *Bedlington*. The hull of the vessel they are at present building for Messrs. J. & J. Paterson & Co., Glasgow. The vessel, which has a deadweight capacity of 9,300 tons, is of the following dimensions: Length between perpendiculars, [illegible] ft., breadth, [illegible] ft., and depth [illegible] ft. She is equipped with [illegible] hold, and large water ballast capacity is provided in cellular double bottom, at peak, and in deep tank amidships. She is fitted with all the latest arrangements for working cargo, and very complete accommodation is provided for officers and crew. The machinery, which is of [illegible] power, is being supplied by Messrs. David Rowan & Co., Glasgow, and both vessel and machinery have been built under the special survey of Lloyd's for their highest class. During construction the vessel has been under the supervision of Mr. Hendry Ross, consulting engineer, Glasgow.

LAUNCH—Irish.

Peralta On August 1st, Messrs. Workman, Clark and Co., Ltd., Belfast, launched from their North Yard the new steamer [illegible] recently launched from the South Yard, and now nearing completion at the Alexandra Wharf. The vessel, [illegible] feet in length, with a gross tonnage of [illegible] 5,000, and has been built under special survey for the highest class in the British Corporation Register of Shipping, besides complying with the requirements of the British Board of Trade, and the United States Steamboat Passenger Inspection Service. The passenger accommodation is [illegible] and comfortable, the decorations and furnishings being of the most artistic and luxurious character, while the private and public rooms are well lighted and ventilated throughout. The cargo space, divided into eight compartments, is completely insulated and prepared for the carriage of fruit, cargo in bulk, the preservation of this cargo being ensured by an efficient installation of refrigerating machinery from which the cooled air is delivered through ducts to each compartment. The vessel is to be propelled by a set of triple expansion engines, having all the necessary auxiliary arrangements, and supplied with steam from five single ended steel boilers working under forced draught.

TRIAL TRIPS.

Koursk.—On June 27th, the s.s. *Koursk* had a successful trial trip at sea. This vessel has just been completed at the Wallsend Shipyard of Messrs. Swan, Hunter & Wigham Richardson, Ltd., to the order of the Russian Volunteer Fleet of St. Petersburg. Her leading dimensions are 420 ft. over all with an extreme breadth of 51 ft. She is to carry 8,500 tons d.w. on a moderate draught. The engines and boilers have been constructed by The Wallsend Slipway & Engineering Co., and worked throughout the trial without a hitch, giving the vessel a speed of over 11 knots. The engines are of the triple expansion type, and the boilers have been fitted with Howden's forced draught. The *Koursk* carries the highest classification certificate of Lloyd's, and also a Suez Canal certificate. In addition to the large cargo capacity of the ship, comfortable accommodation has been fitted amidships for 30 first-class passengers. In the 'tween decks there is accommodation for about 1,200 emigrants or troops. Steam heating has been installed in all living accommodation and in emigrant accommodation. In the after end of the vessel a commodious hospital has been arranged, fitted with all requisites for dealing with cases of accident or illness. During the trial the owners were represented by Prince Maurocordato and the Borneo Co. (the agents of the Russian Volunteer Fleet in England) by Mr. J. D. Ross.

Dunkerquois On July 6th, the s.s. *Dunkerquois*, of about 2,000 tons gross register, built to the order of The Compagnie de Bateaux à Vapeur du Nord, Dunkirk, by the Campbeltown Shipbuilding Co., Campbeltown, and engined by Messrs. David Rowan & Co., Glasgow, ran trials at Wemyss Bay. The vessel is two-decked with poop, bridge, and top gallant forecastle, and has been constructed in excess of Lloyd's highest class for the general carrying trade. On the trial an average speed of 11 knots was obtained, and everything proved satisfactory.

Darnholme.—On July 8th, the first-class cargo steamer *Darnholme*, built by Messrs. Robert Thompson & Sons, Ltd., at their Sandwich Yard, to the order of Messrs. Thomas Smailes & Sons Steamship Co., Ltd., of Whitby, was taken out to sea for her official trial. The trial trip was very successful, the engine running with the utmost smoothness, and a mean speed of over 10 knots was easily

attained, and the owners expressed themselves highly satisfied with both the vessel and her machinery. After the trial the vessel proceeded to Archangel under the command of Captain [illegible]. See Launches, July.

Chinese Prince.—On July 8th, the s.s. *Chinese Prince*, lately launched by Short Brothers, Ltd., Sunderland, left the Wear for her official trials. The trial was in every way satisfactory, the engines working smoothly and steadily and a speed of 12½ knots being maintained. See Launches, July.

Vaigatch.—On July 12th, the steamer [illegible] which has been built by Messrs. Swan, Hunter & Wigham Richardson, Ltd., at their Neptune Shipyard, Newcastle, proceeded on her official trial trip. The steamer is 235 ft. in length by 32 ft. beam, and holds the highest class in Lloyd's Register. Her propelling machinery, which consists of a set of triple expansion engines, boilers, together with the boilers, been constructed at the Neptune Works. She is intended for the passenger service of the Archangel Mourman Company, of Archangel, and has well furnished accommodation amidships for 24 first-class passengers, including a spacious dining saloon, smoke room, and state rooms. There is accommodation forward for 30 second-class passengers, while 2[illegible] third-class passengers are provided for in the 'tween decks aft. On the trial trip a speed of 12¼ knots was attained, everything working to the satisfaction of all concerned.

Hopemoor.—On July 13th, the new screw steamer *Hopemoor*, built by Messrs. John Readhead & Sons, Ltd., West Docks, South Shields, to the order of Messrs. Walter Runciman & Co., Newcastle, was taken to sea on her official trial trip. After the trial, which was in every way satisfactory to all concerned, the vessel returned to the Tyne to load for Civita Vecchia under the command of Captain Rogers. This is the twentieth vessel built for the above firm by Messrs. John Readhead & Sons, Ltd. See Launches, July.

Brierton.—On July 14th, the s.s. *Brierton* proceeded on her official fully loaded trial trip in the Hartlepool Bay, afterwards proceeding on her voyage to Genoa. The machinery and all auxiliaries worked very smoothly, and on the run between Hartlepool Light and Whitby High Lights an average speed of 12 knots was obtained, which was considered highly satisfactory, seeing the vessel was fully loaded. See Launches, July.

Nigaristan.—On July 14th, the s.s. *Nigaristan* proceeded on her official trial trip, and after adjusting compasses in the Hartlepool Bay, proceeded to the measured mile for a test of her speed. The hull and machinery have been constructed to the specification and under the personal supervision of Mr. A. Walker, superintendent engineer to Messrs. F. C. Strick & Co., London and Swansea. See Launches, July.

Mogileff.—On July 18th, the large steel screw steamer *Mogileff* was taken to sea for her trial trip. The *Mogileff* has been built on the Tyne to the order of the Russian Volunteer Fleet Association of St. Petersburg. The vessel was fully loaded with a cargo of coal. The trial was a long one, was entirely successful, and gave every satisfaction, a mean speed of about 12½ knots being obtained. Amongst those present at the trial were Prince Maurocordato, Prince Kokouatoff, Mr. Speshnieff, and Mr. Tcherepanzeff, representing the owners. The chief dimensions of the vessel are: Length, 412 ft.; breadth, 52 ft.; and depth moulded, 29 ft. 9 in. She carries over 8,000 tons deadweight on a moderate draught of water. The *Mogileff* is arranged for the accommodation of 1,150 emigrants under the shelter deck, with accommodation in the house above for 30 first-class passengers. The propelling machinery has been supplied by the Wallsend Slipway and Engineering Co., Ltd., and consists of triple expansion engines having cylinders 27, 45, and 75 in. by 48 in. stroke, steam being supplied by three boilers working at 180 lb. pressure. After the trial the vessel returned to the Tyne to take in stores prior to her sailing for Constantinople.

Ul.—On July 18th, the new steel screw steam yacht *Ul*, 730 tons Y.M. and 854 tons gross, built at Leith for His Imperial Highness the Archduke Charles Stephen of Austria, went on her trial trip in the Firth of Forth, with most satisfactory results. Notwithstanding that the yacht was in her deepest sea going trim with over 200 tons of coal and stores on board and although a very strong wind was blowing, on various runs over the measured mile at Gullane a speed of 13 to 13½ knots was easily attained without unduly pressing the boilers. See Launches, July.

Brooklet.—On July 21st, the handsome steel screw steamer [illegible], built by Messrs. Wm. Gray & Co., Ltd., for Messrs. Needham Bros., West Hartlepool, had her trial trip. The vessel has been built to Lloyd's highest class, and her principal dimensions are: Length over all, 340 ft. 6 in.; breadth, 47 ft. 6 in.; and depth, 25 ft. 7½ in. She has long bridge, poop, and topgallant forecastle. The saloon, state rooms, captain's, officers' and engineers' rooms, etc., are fitted up in houses on the bridge deck, and the crew's berths in the forecastle. Her engines are of the triple expansion type, supplied from the Central Marine Engine Works of the builders, and have cylinders 25 in., 40 in., and 65 in. diameter, with a piston stroke of 42 in. Steam is generated in two large steel boilers made for a working pressure of 180 lbs. per square inch.

Rokkosan Maru.—On July 22nd, the fine steel screw collier, *Rokkosan Maru*, built by Sir Raylton Dixon and Co., Ltd., of Cleveland Dockyard, Middlesbrough-on-Tees, to the order of Messrs. Mitsui Bussan Kaisha, Ltd., of London and Japan, through Messrs. Glover Bros., London, proceeded to sea for her official trial. The vessel is of the latest and most improved type of patent "Cantilever" construction with top-side water ballast tanks, to class 100 A1 at Lloyd's, single deck type, with poop and forecastle and engines aft. Her principal dimensions are: 275 ft. by 42 ft. 3 in. by 20 ft. 6 in. moulded, and she has a deadweight carrying capacity of over 3,000 tons on a light draught of water. She has four large hatchways, three holds absolutely free from all obstructions such as beams, pillars, or web frames, and perfectly self trimming owing to the sloping sides of the top-side tanks at each side of the ship, and of the total amount of about 1,100 tons of water ballast which the vessel can carry, about one-half of this quantity will be contained in the top-side tanks. The vessel has two masts, eight derricks, large donkey boiler, four boats, electric light, hand and steam steering gear, and is equipped with nine steam winches, steam windlass, etc., and all the latest and most modern appliances for the rapid handling of cargo. Triple expansion engines, placed aft, 21, 35, and 57 in. by 30 in. stroke, supplied with steam by two large single-ended boilers, working at 180 lbs. pressure, have been fitted by Messrs. Blair & Co., Ltd., Stockton-on-Tees. The trials passed off most successfully.

Steam Tug for the Eastern Mediterranean.—Mr. Edward Hayes has just run the trial trip of a steam tug built for the Eastern Mediterranean. She is a sister boat to others supplied to the Admiralty, many foreign governments, harbour boards, shipping lines, etc. Her length is 51 ft., breadth 11 ft., draught about 4 ft. 3 in. She has four bulkheads and steel floors of extra depth to give great strength in case of grounding and to minimize vibration. Forward of the collision bulkhead is the cable locker, the remainder of the fore part of the boat being used as a cabin for the crew and provided with lockers, cupboard and folding table. Aft of the cabin, between steel bulkheads, is the machinery space. The main engine is a "Hayes" standard C.S.C. open front type, having cylinders 8 in. and 16 in. by 10 in. stroke. The crank shaft is balanced and cut from a solid piece of Siemens-Martin steel. Automatic lubrication and water service are both fitted. The air, circulating feed and bilge pumps are worked off the L.P. crosshead by long rocking levers. The boiler is of the marine return tube type built under Lloyd's survey for 120 lbs. working pressure. A bilge ejector and auxiliary feed pump are also fitted in the engine-room, the latter drawing water either from the fresh-water tank or the boat side. All the upper woodwork is of teak. The aft space is arranged to sleep extra hands if required. A hand slip towing hoop is mounted on a stout oak post and a towing bow is placed aft. The boat is provided with a stout canvas awning, mounted on galvanized iron uprights, and hand railing. Her specified speed was 12 miles an hour, but she easily exceeded this on her trials, and on her coal consumption test proved herself to be very economical. She was easily handled and is a good rough-water boat.

BOARD OF TRADE EXAMINATIONS.

NOTE—1C denotes First Class. 2C Second Class.

May 25th, 1911.

Adamson, W. 1C Aberdeen
Allison, H. 1C N Shields
Atkins, H. 1C Liverpool
Bell, W. 2C Aberdeen
Beaton, W. 2C Aberdeen
Blakiston, R. 1C Sunderl'd
Bonner, W. 2C Liverpool
Browning, I. 1C N Shields
Bulloch, L. 2C Aberdeen
Cameron, A. 2C Greenock
Christison, J. 2C N Shields
Cole, C. ..... 2C Hull
Digney, J. 2C N Shields
Dodd, T. 1C Sunderl'd
Duncan, P. 2C Liverpool
Ford, G. 1C N Shields
Ferguson, J. 1C N.Shields
Fry, F. 1C Bristol
Gilchrist, T. 2C Hull
Herriott, W. 2C Liverpool
Hodgson, R. 2C Sunderl'd
Hume, H. 2C London
Hynd, M. .... 2C Greenock
Irvine, W. 1C Liverpool
Kenny, T. 1C Liverpool
Lamont, J. 1C N Shields
Lees, W. 2C Greenock
McLaren, A. 1C Hull
McNeill, H. .. 2C London
Murray, G. 2C Aberdeen
Nesbit, W. .... 1C Sunderl'd
O'Hara, D. .... 2C Greenock
Pearson, W. 2C London
Simmons, J. 1C London
Simpson, R. 1C Sunderl'd
Smaill, W. A. 2C Bristol
Thompson, H. 1C London
Turzell, W. .... 2C N Shields
Walker, T. .... 2C Sunderl'd
Wall, T. 2C Sunderl'd
Watson, F. .... 2C N.Shields
Webster, H. 1C N.Shields
Watson, W. R. 1C Liverpool
Wardall, T. S. 2C Sunderl'd
Wright, C. .... 1C Sunderl'd

June 1st.

Aikman, T. 2C Falmouth
Anderson, A. 2C Glasgow
Bell, J. 2C N Shields
Bradford, S. 2C London
Burrell, J. .... 2C Leith
Burt, T. 1C Leith
Byles, T. 1C London
Campbell, H. 1C Glasgow
Chalcraft, R. 2C Cardiff
Clough, A. 2C N Shields
Cumming, A. 1C Liverpool
Dawson, K. 1C N.Shields
Elverton, A. J. 2C London
Forrest, J. 2C Glasgow
Fulton, W. 1C Belfast
Hay, E. 2C Liverpool
Hartland, A. 1C London
Gamble, W. 1C Glasgow
Greenwood, J. 2C Liverpool
Hunter, A. 1C Glasgow
Hutton, S. 1C London
Jones, W. 2C London
Jones, J. 2C Liverpool
Jones, E. E. 1C Liverpool
Jones, H. 2C N.Shields
Landreth, E. 2C N.Shields
Lloyd, H. 1C Liverpool
Lockhart, J. 2C Glasgow
Lord, C. 1C N Shields
Lucock, J. 1C Liverpool
McGregor, D. 2C Liverpool
McGregor, T. 2C London
McPhee, W. 1C Glasgow
Morgan, J. 1C Cardiff
Marshall, J. 2C Cardiff
Neale, J. 1C Liverpool
Reid, J. 2C Belfast
Robinson, J. 1C Belfast
Silverthorn, J. 2C Cardiff
Steele, J. 2C Glasgow
Stokes, W. 1C Glasgow
Thompson, J. 2C N Shields
Tyler, A. 1C Leith
Wells, C. 1C Liverpool
Whitewright, J. 1C Glasgow
Whitton, W. 2C Glasgow
Williams, F. 2C Cardiff

June 8th.

Bennett, R. .... 1C London
Binns, O. .... 2C N.Shields
Brandy, W. 2C Liverpool
Brodie, W. .... 1C Liverpool
Dodds, C. .... 2C N Shields
Ferguson, W. 1C Glasgow
Freeman, C. .. 1C N.Shields
Hetherington, T. 2C N Shields
Johnson, J. .... 2C N.Shields
Johnstone, J. .. 1C Liverpool
Long, A. 2C Glasgow
Lister, W. 2C London
Lawson, A. .... 1C Glasgow
Marks, F. 1C Liverpool
Martin, J. .... 1C Liverpool
Mee, F. 1C Glasgow
Ranson, C. .... 1C N.Shields
Richardson, G. 1C Liverpool
Taylor, F. .... 2C London
Thomas, W. .. 1C London
Thoms, W. .... 2C N.Shields
Whitelaw, T. .. 2C N Shields

June 15th.

Akester, S. .... 1C Hull
Alexander, J. .. 1C Dundee
Baxter, H. .... 1C Liverpool
Black, L. 2C Greenock
Court, A. 1C Liverpool
Duncan, R. .. 1C Liverpool
Dawson, S. 2C Hull
Graham, B. 1C Liverpool
Harland, C. 1C London
Hewitson, C. .. 2C Liverpool
Hutchinson, L. 1C Greenock
Jesty, W. 1C Liverpool
Jones, F. 2C Liverpool
Laird, D. 2C Dundee
Lodge, G. 1C Hull
McCallum, N. 2C London
Robertson, J. .. 1C Greenock
Smith, P. 2C Dundee
Sykes, W. 2C Hull
Walker, W. 2C Hull
Young, A. .... 1C London

June 22nd.

Agar, W. 1C W.Hart'l
Alison, W. 1C Leith
Andrew, J. .... 1C Leith
Bell, R. 2C Liverpool
Becker, E. H. .. 2C South'ton
Brown, J. 2C Cardiff
Cameron, J. 2C Glasgow
Cooper, J. 2C London
Cole, D. 2C Cardiff
Cross, A. 2C Glasgow
Daniel, A. .... 2C Glasgow
Dougan, J. 2C Glasgow
Eve, P. H. .... 1C South'ton
Fletcher, G. 2C N Shields
Forster, James 1C Greenock
Fraser, W. 2C Liverpool
Fraser, A. 2C N Shields
Gray, W. 2C Greenock
Hall, G. 2C N Shields
Heathcote, J. 2C N Shields
Hester, A. 1C N Shields
Hughes, A. 1C Cardiff
Jaggard, F. G. 1C London
Jobson, W. .... 1C N.Shields
Johnson, S. .... 2C N Shields
Johnstone, A. .. 1C Glasgow
Kent, J. 2C Cardiff
Kerr, J. 1C Cork
Lewis, J. 1C Cardiff
Liddell, R. .... 1C Leith
Little, W. 1C Liverpool
Lloyd, A. 2C Cardiff
Mackenzie, J. G. 2C Liverpool
McNaught, T. 1C Liverpool
Maguire, J. .... 2C Cork
Mapstone, H. .. 1C N Shields
Mylrea, W. .. 2C Borrow
Nelson, J. 1C N Shields
Platts, T. 2C W. Hart'l
Pierce, A. 2C Liverpool
Russell, J. .... 1C London
Russell, G. 2C W. Hart'l
Sinclair, F. 2C Liverpool
Smillie, A. .... 2C Glasgow
Smith, C. 1C Cardiff
Taylor, H. .... 2C Liverpool
Thomas, R. 2C N Shields
Turner, G. .... 2C London
Welton, S. .... 1C N.Shields
Wilkinson, E. 1C Liverpool
Wilson, D. 2C Glasgow
Woolcock, T. .. 2C Cardiff
Young, W. .... 2C South'ton

June 29th.

Anderson, J. .. 1C Aberdeen
Brecknell, J. .. 2C Liverpool
Clark, J. 1C London
Cormack, W. .. 2C Hull
Constain, G. 1C Liverpool
Cripps, A. 1C Bristol
Crook, H. 1C Liverpool
Davies, A. .... 1C Liverpool
Davies, S. .... 2C Liverpool
English, T. 2C Aberdeen
Grant, F. 1C Hull
Lloyd, G. 1C Liverpool
Lodge, W. .... 2C Liverpool
MacDonald, J. A. 2C Liverpool
Macfarlane, W. 1C Greenock
McLaren, J. 1C Greenock
Morris, H. 2C Liverpool
Morton, J. 1C Liverpool
Signal, S. 2C London
Smith, W. .... 1C Aberdeen
White, O. 1C Liverpool
Williams, A. 1C Bristol
Wilson, J. 1C Sunderl'd
Young, H. 2C Greenock

July 6th.

Armitage, J. 1C Liverpool
Batchen, G. 1C Glasgow
Dickinson, W. 2C N Shields
Evans, E. .... 2C Cardiff
Dunlop, J. 1C Glasgow
Fraser, J. 2C London
Cordiner, A. .. 2C South'ton
Dunlop, G. 2C Glasgow
Dougan, H. 2C Glasgow
Dougan, A. 2C Glasgow
Duncan, A. 2C London
Duncan, D. 2C London
Duncan, J. 1C Leith
Edwards, S. 2C Cardiff
Ellis, F. 2C Liverpool
Evans, G. 2C Liverpool
Fraser, J. 2C Leith
Gordon, D. .. 2C Leith
Griffiths, J. .... 1C Cardiff
Henderson, A. 2C Glasgow
Hill, H. 1C South'ton
Hunt, W. 2C Cardiff
Jamieson, J. .... 1C Glasgow
Jones, D. 2C Liverpool
Jones, J. 2C London
Mackay, J. 2C Glasgow
McMillan, J. .. 2C N Shields
Moss, J. 2C London
Nicholson, A. .. 1C Leith
Peddie, A. .... 2C N.Shields
Peel, J. 2C N Shields
Porter, J. .. 2C Cardiff
Scott, D. 2C Belfast
Sime, G. 2C Leith
Stedman, E. .. 2C South'ton
Stevens, J. 2C Cardiff
Talbot, L. 2C Cardiff
Thomson, W. .. 2C Leith
Watson, W. .. 2C Liverpool
White, J. 2C Leith
Wilkinson, A. .. 2C N.Shields
Wilson, H. 2C N Shields
Wilson, J. 2C Glasgow
Woodward, H. 2C Liverpool
Younger, J. 2C Leith

July 13th.

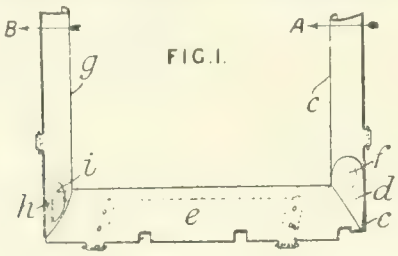
Adams, W. .... 2C N.Shields
Blackstock, J. 2C Greenock
Douglass, D. .... 2C N Shields
Dunford, S. 2C London
Coggon, F. .... 1C Hull
Colville, J. .... 2C Greenock
Dawson, K. 1C London
Douthwaite, J. 2C N Shields
Dyer, R. 2C Liverpool
Evans, D. .... 2C N.Shields
Finnagan, J. .. 2C Liverpool
Gibson, C. 1C Liverpool
Goodfellow, R. 2C N Shields
Graham, W. .. 2C N Shields
Hollingsworth, J. 2C N Shields
Hunter, J. 2C Hull
Hutchinson, J. 2C N Shields
Jones, H. 2C London
Jaggs, W. .... 1C Hull
Jones, O. 2C Liverpool
Jones, T. 2C Liverpool
Kjode, J. 1C London
Lewis, J. 1C Liverpool
McAlpine, H. 2C Greenock
McIntosh, J. 2C Greenock
McLean, J. 1C Liverpool
Moore, J. 2C N Shields
Marsden, J. 2C N Shields
Mayne, J. .... 2C London
Moss, 1C London
Murphy, J. 2C Greenock
Porter, G. 1C Liverpool
Richmond, J. 1C Greenock
Robinson, G. 2C Liverpool
Roberts, F. .. 2C Liverpool
Saville, H. .... 2C N Shields
Shaw, G. 2C Greenock
Smith, G. 2C Hull
Stewart, J. A. 2C Sunderl'd
Williams, 2C London
Wood, J. 2C London

[illegible]	[illegible]	Law, R.	1C N. Shields
		Mc[illegible]llum, N.	2C N. Shields
[illegible]	1C W. Hart'l	Mc[illegible]	2C Liverpool
[illegible]	[illegible]	McKay, D.	1C Glasgow
[illegible], A.	[illegible] N. Shields	McMahon, D.	2C Glasgow
Black, S.	1C Leith	Moore, T.	1C London
[illegible]	[illegible]	Muddar, A.	2C Liverpool
Bradley, A.	2C W. Hart'l	Morrell, A.	2C W. Hart'l
Butterworth, R.	1C Cardiff	Osborn, J.	1C London
[illegible]	1C Leith	Pearne, E.	2C Glasgow
[illegible]	2C Liverpool	Peers, G.	2C N. Shields
[illegible], W.	2C London	Playfair, J.	1C Glasgow
[illegible]	1C Liverpool	Runciman, J.	1C Liverpool
Crawford, D.	1C Southt'on	Sanderson, J.	1C W. Hart'l
[illegible]	1C W. Hart'l	Smith, A. F.	2C London
[illegible]	2C Glasgow	Smith, A. C.	2C Cardiff
Gower, W.	2C London	Smith, W.	2C W. Hart'l
Griffiths, W.	2C Cardiff	Stevens, W.	1C Cardiff
Hackworth, E.	2C W. Hart'l	Taylor, F.	1C W. Hart'l
Hann, A.	1C London	Thomson, J.	2C Liverpool
Higley, H.	2C Southt'on	Waugh, W.	2C W. Hart'l
Hughes, J.	2C Liverpool	Wheatcroft, J.	2C London
Jones, J. W.	1C Liverpool	Whitfield, W.	1C N. Shields
Kelly, J.	1C Liverpool	Wilson, G.	1C Glasgow
Ladd, J.	1C Cardiff	Young, C. T.	1C Leith

The Marine Engineer and Naval Architect Patent Record.

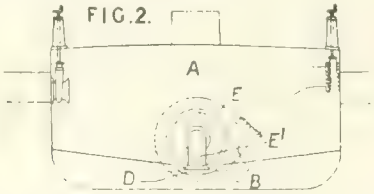
Compiled by Messrs. E. P. Alexander & Son, Chartered Patent Agents, 306, High Holborn, London, W.C.

8554. Ships. Relates to hinged metal plates for protecting the sides and bottom, etc., of water-tight doors, hatchways, etc., and for preventing pieces of coal and other objects from striking against them and deforming them. The plates *c*, *g*, hinged to the sides of the frame, are of curved form, and are provided with swellings *i*, *h*, which engage the curved



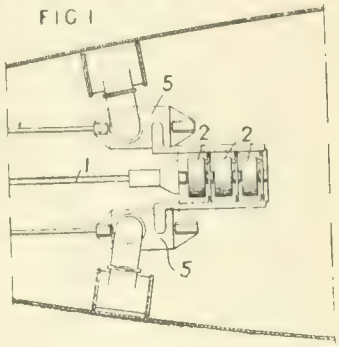
upturned ends *d*, *i* of the protecting-plate *e* hinged to the footstep. The parts are so arranged that the turning of the plate *c* by the sliding of the door in the direction A, B, automatically effects the turning of the plates *e*, *g*. The protecting-plates may be applied to vertically-sliding or hinged doors, etc., inclined planes or bevels being arranged to cause the turning of the plate *c*.

8671. Ships, etc. In that type of self-ejecting barge for sewage, oil, etc., in which a large hold A having a double bottom B is disposed amidships and is provided with one or more longitudinal gutters, troughs, etc., terminating in a



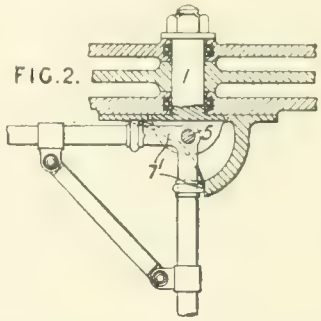
pocket or well D whence the sewage, etc., is discharged by means of a pump E through a suction pipe E1, the pump E is actuated from the driving-machinery of the barge, for example through a clutch adapted to connect the main engine shaft to the pump shaft.

9036. Turbines combined with rotary engines. A power plant comprises turbines and rotary engines in combination. In a ship propelling-plant with three shafts, the centre shaft 1 is driven by rotary engines 2, and the outer shafts are driven by turbines 5 actuated by the exhaust from the



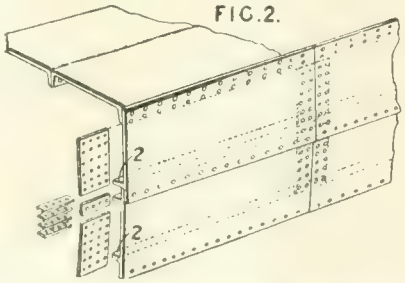
rotary engines. Other combinations are described. The turbines may be of any construction, and the rotary engines may be of any construction in which reciprocating parts are entirely eliminated, but are preferably of the type described in Specification 15,311/09.

9047. Propelling Ships, etc. Comprises an apparatus for propelling aerial and marine vessels and consists of two blades at right-angles mounted on arms 6, which are in the same plane. The arms are pivoted to the ends of the driving shaft 1 by the pin 5 and engage a cam surface 7[1] of such shape that, as the shaft 1 rotates, the blades will be moved,



so that, when one blade is horizontal and effective, the other blade is merely cutting the air or water and moving vertically. Reversal of the direction of motion only reverses the upward movement, the forward propulsive movement being unaltered. Two sets of apparatus as above are used, and driven in opposite directions by a single worm actuating two worm-wheels.

9462. Ships, etc. Relates to structures built up of a series of flanged plates, the flanges serving to strengthen them. In the application to ships, the plates are formed with ribs or flanges 2 disposed at a short distance from each edge, and arranged so that the end of one plate overlaps the end of an



adjacent plate to which it is riveted. Longitudinal I-beams are used as keelsons and engine-bearers, and may run the full length of the vessel. In a modification, the plating is carried out vertically, the ribs 2 in this case acting as transverse frames.

The Marine Engineer

And Naval Architect.

LONDON, OCTOBER, 1911.

COLLISIONS BETWEEN WARSHIPS AND MERCHANTMEN

WE are quite sure that the greatest possible sympathy will be felt for the White Star Company on the serious disaster that has befallen them by the temporary putting out of commission of the *Olympic*, at the commencement of her career, as the result of being rammed by H.M.S. *Hawke*. The circumstances under which the collision took place are as remarkable as they are unfortunate. The huge liner, with some 3000 persons on board, had left Southampton for Cherbourg, and was proceeding along the Solent in the middle of the day in clear weather and was rammed in the starboard quarter, apparently without the slightest warning or excuse, by a protected cruiser of over 7000 tons displacement and 12,000 horse power, which was following her at a speed somewhat greater than her own. Until the enquiry which will naturally follow takes place one can only reasonably assume either that something had gone wrong with the steering gear of the *Hawke*, or particularly in view of the close proximity of the two vessels to one another immediately preceding the collision, that the suction of the larger vessel in passing through the water set up a diverting influence on the smaller vessel and drew her out of her course. The public will await with the deepest interest the result of the enquiry into an accident which will affect a large number of people, as we understand that all the berths on the *Olympic* had been booked up for some months ahead, and it is thought that the time occupied in effecting the repairs will probably preclude the vessel from crossing the Atlantic again this year. We believe that only temporary repairs can be effected at Southampton, and the vessel will be taken round to Belfast for the permanent repairs. While we are on the subject of this collision we may usefully refer to a discussion which took place in the House of Commons in August last between Mr. Fred Hall, M.P., and the Financial Secretary to the Admiralty. It appears from the questions put by Mr. Hall and the answers given by the Financial Secretary that in June last the battleship *King Alfred* collided with a merchant steamer called the *Cheapside*, with the result of total destruction to the latter. Under the Merchant Shipping Act the liability is limited to £8 per ton of the registered tonnage. As no cause of action could lie against the man-of-war or the Lords of the Admiralty, the owners sued the commander of the *King Alfred*, who was defended by the Treasury Solicitor. The Court held that both vessels were to blame, and the Registrar proceeded to assess the claims on this basis by consent of both parties. It will be understood that this procedure does not make the Admiralty liable, but estimates the damages which they usually pay as a voluntary payment when a man-of-war has blame put upon it by the Court. The point raised by Mr. Hall is a very important one for shipowners, and has reference to the claim put forward by the Admiralty, which included in round figures £334 for cost of repairs, £1,200 for loss of use of the vessel, and £2,554 for loss of time and expenses of the officers and crew during the time of detention. It was claimed by Mr. Hall that it is a hardship upon the British shipowner, because, if he happens to get into collision with a battleship, naturally, the cost of crew and officers is exceedingly greater than would be the case with regard to two merchant ships. The question was whether it was necessary to maintain 32 officers and 590 men on the ship for three weeks, while repairs to the amount of £334 were being effected, and, if so, what were they doing. If work of re-fitting, apart from work necessitated by the collision, was carried out during the period, it was unfair that the shipowners should be debited with the whole cost of the wages and provisions of the ship's company for the three weeks. The Financial Secretary in his answer, after explaining the fact, expressed the view that he could not go behind the finding of the Court, and, if he had contented himself with this, perhaps the question could have been considered to be answered, but the further explanations he thought fit to give, certainly start a new train of thought altogether. We agree with him, that the men were, no doubt, busy on the ship during the three weeks, and that it was not practicable to dispense with the crew for that period, to find new jobs for them and to reassemble them at the end of the period when the repairs were made, but on being pressed as to the actual work performed, he said that the men were going on with their ordinary duties—their ordinary training duties and their ordinary military duties—and the Registrar admitted the claim in full. It would be interesting to know whether, if at all, the Registrar had any knowledge or evidence as to the composite character of the duties of a crew on a man-of-war, and if so how the duties appertaining to the work of the ship as far as the collision repairs were concerned, were separated from the training and military duties, and what basis of differentiation could be adopted in assessing damages if such a separation of duties could be made. The short point is, is it fair that a shipowner should be debited with the cost relative to training or military duties which must be carried out somewhere for the benefit of the nation simply because they are being carried out on a ship which is being repaired owing to collision. On the face of it, we must confess that it seems to us obviously unfair to do so, as the proper basis should certainly be on the number of men employed wholly on the repairs or a proportion of the time of the whole crew by eliminating the time spent on training and military duty. There appears to be a

distinct difference between a merchantman and a man-of-war, as with the former the laying-up is a complete stoppage of beneficial use and is a dead-loss to the owner, while with the latter the beneficial use from the national standpoint does not cease as far as training and military duties are concerned. The subject is well worthy of the attention of shipowners, for we see no reason why they should be penalized with damages which the nation does not actually suffer.

OIL FUEL.

It is interesting to note the results obtained by American engineers in the matter of oil fuel, particularly in view of the development that is taking place in its use on this side of the Atlantic. In the journal of the American Society of Mechanical Engineers, setting out the transactions of the Society at the San Francisco and Boston meetings, a most interesting series of papers were read upon the subject of oil fuel, which formed the basis of a topical discussion on the matter. Space will not allow us to deal with all the branches of the subject treated, but we may perhaps usefully refer shortly to the paper on "Oil Fuel for Steam Boilers," by Mr. B. R. T. Collins. The result of the author's experience is that weight for weight oil has calorific value 30% higher than high-grade coal, and having regard to the less volume occupied by oil compared with an equal weight of coal, 50% more oil fuel can be stored in the same space as a given amount of coal. Oil is found not to deteriorate by storage like coal, and maintains its heat value indefinitely. The chimney area is only 60% of that required for coal, hence a smaller amount of heat is lost by reason of the smaller amount of air heated and discharged through the chimney. The higher heating efficiency is effected not only by the use of less excess air, owing to more perfect combustion under good control, but also due to a more equal distribution of heat in the combustion chambers, as doors do not have to be opened, and a very small amount of soot is deposited on the tubes. Owing to the heat being more evenly diffused over the entire heating surface of the boiler, the amount of heat absorbed by the metallic surfaces is raised. Again, smoke can be entirely eliminated, and as no cleaning of the fires is necessary, the boiler can maintain its maximum capacity continuously, which means less boilers in commission for a given power than when coal is used. The cost of handling is much reduced, as the oil can be pumped from any reasonable distance; there is an absence of dust and ashes, consequently the engine room is much cleaner and less wear and tear occurs in the machinery. The use of firing tools is avoided and no risk of damage to furnace linings from this cause obtains. It is found that the shrinkage and loss of handling oil is much less than that of coal, while the labour bill for firemen, coal trimmers and such men is enormously reduced. The author claims that from 35 to 50% increase of capacity over coal takes place by the substitution of oil therefor depending on the quality of coal and cost of handling same, but if one is to understand that a boiler will have its capacity increased by this amount as a result of a mere substitution of fuel, we do not think this result could be proved in practice with a boiler of average design working under normal conditions. The disadvantages of oil fuel may be summarized as: Low flash point, as it should not be lower than 140° Fahr., where the danger with men of ordinary intelligence is no more than with coal; and in the case of feed-water with high scale-making quality the cost of repairs is likely to be higher when adopting oil owing to the intense temperature developed in the furnace unless a proper refractory setting is provided for burning oil. The discussion which ensued on this paper was of a most interesting character, and indicates the solid grip that American engineers have of this particular subject.

THE FRENCH NAVAL DISASTER.

The sympathy of the people of all countries will go out to the French nation and navy in the tremendous loss they have sustained in the catastrophe which has deprived them of a splendid ship of war, and has further resulted in the immediate loss of over 200 valuable lives, and nearly 200 injured, many of whom, it is feared, cannot survive. The battleship *Liberté*, one of the finest and latest units of the French fleet, was lying in Toulon harbour when she was blown up on the 25th September, as a result of a series of explosions. At the time of going to press the cause of the explosions is not definitely established, but it is thought that they were due to the spontaneous combustion of gunpowder. Another report states that the explosion was caused by a fire, with which the men had been contending for some time, reaching the powder magazine. Several French men-of-war were in the harbour at the time of the accident, and so great was the force of the explosions that most of them had men killed or injured; neither did the vessels escape injury, and on page 103 we are able to give an illustration of the damage done to the *République*. On the same page is an illustration of all that remains of the *Liberté*, which at high water cannot be seen, a buoy marking the spot where she lies. Toulon harbour was strewn with wreckage.

The *Liberté* was launched at St. Nazaire, in April, 1905, and was completed for sea in 1907. Her displacement was 14,900 tons, speed about 19 knots, and her cost was nearly £1,600,000. The vessel was of the following dimensions: length over all, 452 feet; beam, 79½ feet; maximum draught, 28 feet; and she carried a complement of 793 men. Her sister ships are *Démocratie*, *Justice* and *Vérité*.

THE "PAPANUI."

THE fact that ill-luck seems to dog certain vessels would really appear to be indisputable. Look at the history of the steamship *Papanui*, which was built for the New Zealand Shipping Company in 1899. She was constructed by a well-known and highly respected firm, Messrs. Wm. Denny & Bros., of Dumbarton, who have turned out several vessels for the same fleet as that for which the *Papanui* was built. Her sisters have all done well. There is no possible reason that can be adduced to account for her ill-luck. Yet that she was unlucky her history shows. Her first trouble occurred when she struck an uncharted rock off Waterhouse Island, Tasmania. Thereby she sustained most serious damage, and was in fact cast from the New Zealand Company's fleet in consequence. No blame for what occurred could be laid upon her construction, management or navigation. Then came her troubles in regard to repairs. It was determined by her new owners that these should not be effected in an Australian port, presumably on account of the excessive cost of work done under the Commonwealth system. There were objections to giving her clearance, on the ground of the sufficiency or otherwise of the temporary repairs which had been undertaken to enable her to get away. Eventually she was put under the Nicaraguan flag.

She made the voyage to Japan in safety, and was there repaired, as described and illustrated in the issues of the *Marine Engineer and Naval Architect* of February and May, 1911, and put in an efficient state again. She returned to Australian waters, ungratefully abandoned the flag which had proved so useful to her and assumed again British registry, this time at Melbourne. Then she was engaged to bring passengers to London for the Coronation festivities. On the voyage she was considerably delayed by machinery difficulties, and even got into the overdue list. Now, apparently, the end has come. Returning to Australia, *via* the Cape route, she embarked some 347 steerage passengers in London, and all seems to have gone well till she reached the South Atlantic, when a bunker fire broke out on the 5th September. After five days' exertions it was subdued. But after passing St. Helena another bunker proved to have caught fire also, and the master resolved to put back to the island. In doing so he seems to have been well advised, for the second fire proved serious enough, and had he not put into a port of refuge there would probably have been much loss of life to deplore. The vessel reached St. Helena on the evening of the 11th September, and it became necessary to land the passengers. By 5 a.m. the following morning the work was completed, accommodation being provided for them on shore. This duty was carried out none too soon, for by eight o'clock that morning the vessel was ablaze fore and aft and had to be beached in Jamestown bay, where the wreck was abandoned. So ends an unlucky career, fortunately without any loss of life.

THE MARITIME [illegible] the Institution of Naval Architects has granted the Maritime Scholarship in Naval Architecture of the value of £[illegible] per annum for three years, to Mr. Albert Percy Cole, of Portsmouth Dockyard.

THE FLEETS OF THE MAIL LINES.

(From our Own Correspondent.)

Cancellation of a Certificate.

IT is not often generally that we have to record the cancellation of a mariner's certificate of competency [illegible] in the [illegible] and [illegible] there [illegible] more than one. A Court at Quebec has however found it right to cancel for ever the certificate of a master and mate held respectively by Captain [illegible] Young and chief officer Ohlson [illegible] of the steamship *General Wolfe*. The vessel in question on the morning of the 28th June, with a crew of twenty-three hands and [illegible] passengers was in the St. Lawrence on her voyage to Quebec when they sighted a light which proved to be that of the steamship *Lawrence*. A collision took place between the two vessels. The master mate and helmsman of the *General Wolfe* left their posts and seeking their own safety scrambled aboard the *Lawrence*. That vessel however launched her boats and the second officer of the *General Wolfe* who was off duty when the collision occurred, being awakened by the impact came on deck and ordered the crew to their boat stations. Thus all on board were safely got away before the *General Wolfe* went down and there was no loss of life. But the Court in a scathing judgment expressed its opinion that by their conduct the master and chief officer of the ill-fated ship had shown themselves entirely unfitted ever again to be trusted to take command.

The Belgian State Railway,

as I mentioned last month has cast from its fleet two twenty-five year old paddlers. But it still retains on its list several still more antiquated vessels, which as far as one can see can never really be required for its mail and passenger service. Surely the management would be well advised to clear away these obsolete craft, for other companies, notably the South Eastern and Chatham Railway, are in the habit of issuing notices as to the names of the vessels which are, or can be employed in the passenger service. If the Belgian Government were to get rid of the other vessels which it can never again use, it might encourage travel by its line, for people are sometimes afraid to use a line which retains old vessels, from the fear that, under pressure of circumstances they may some day find themselves on board an old vessel which has been brought out again to take emergency sailings. Not only is the Ostend service bringing new and improved vessels on to its station, but it is giving further facilities to the travelling public by giving additional opportunities to third class passengers. These have long been carried in the night steamers and now the announcement is made that on and after the 1st October, 1911, these opportunities will also be found by their less wealthy clients in the steamers and trains which maintain the afternoon sailings. A line which is so up to date would surely be well advised to clear its lists of the older vessels.

The Anchor Line,

by its despatch from the Clyde on the 16th September of its new twin screw steamer *Caledonia* relegated the old *Lucania* to the position of reserve ship and is thus in the position of being able to maintain its weekly service to New York with a well balanced fleet of modern twin screw liners. This position it has been working to achieve ever since the coming out of the *Caledonia* in 1910.

The White Star Line,

which a few weeks ago took over from the Red Star Line the twin screw steamer *Southwark* and gave to the name of *Belgic* which [illegible] the name at two passenger stations of the fleet, has now resumed possession of another vessel which for some years has flown the Belgic flag. This is the steamship *Cymbrian* originally built as the *Cymric* for the joint service of the White Star and Shaw Savill and Albion lines between London and New Zealand. On her return to her old owners the *Cymbrian* takes back her original name. It would [illegible] from these changes that in the [illegible] of the White Star Line amongst the fleet of the Combine will assume more and more overwhelming proportions. For the same Shaw Savill and White Star service Messrs. Workman, Clark & Co. on the 12th September

launched a new twin-screw liner of the same size as the [illegible] which will be known as the *Hibernia*.

The close connection

between the Peninsular Steam Navigation Company and the Royal Mail is further evidenced by the recent announcement that the [illegible] built in 1899 at Barrow by Messrs. Vickers, Son & Maxim, for the first-named company, and now transferred to the Royal Mail will in future be known as the *[illegible]*.

Two recent cases

have shown the importance of those in charge of coasting steamers keeping a good look-out especially during the fine weather. The fine weather tempts small boats to venture out, and it is obvious that they are unable to protect themselves by keeping out of the way of fast steamers. The first case was that of the steamship *Stokesley Castle* of Southampton which off the entrance to Poole Harbour at the beginning of July ran down a small sailing boat the *Osiris* with the result that one of the two men in charge of the boat, together with the lady and her two children who had hired the little vessel, were drowned. The rule of the Company which owned the steamer was that there should always be a look-out forward, but in fine weather this obligation seems to have been omitted by the master who, from the bridge, fulfilled the duty himself. In the *Stokesley Castle* the bridge is behind the funnel and thus over an arc of seventeen degrees the view to starboard from the port side of the bridge was obscured. Similarly, of course, there was a like area on the other bow obscured from the starboard end of the bridge. The master sighted the *Osiris* when from three-quarters of a mile to a mile away. He thought he would clear her and went to a position whence he could not see her, and remained there till it was too late to do anything to avoid the collision. In the result a Board of Trade inquiry suspended his certificate as home trade master for a period of twelve months. Hardly was this inquiry finished when another case of a similar nature occurred. The coasting steamer *Winstanley*, of Dublin, ran down a small boat on the last day of August in clear weather just after leaving Dartmouth. Again the little boat was not seen till too late. Again there was no look-out forward the master having taken that responsibility upon himself. In this case the master left the bridge and went down to the wheelhouse because the crew were engaged in washing down the bridge and the decks. From the wheelhouse it was impossible to see so small an object as a boat on the bearing in which this little vessel lay, as the steamer was in ballast and down by the stern. Of the two men lost in this accident only the body of one was up to the date of the inquest, recovered. A coroner's jury, considering that the master here had been guilty of more than ordinary negligence, brought in a verdict of manslaughter, and he was committed for trial at the Assizes on the coroner's warrant. The lesson of these two cases should be taken to heart generally and on no account should a proper look-out be omitted under any circumstances.

The case of the "Roebuck"

is another example of ill luck. This steamer, which is a well-known member of the Great Western Railway's Channel Islands fleet, was built in 1899 at Barrow by Messrs. Vickers, Son & Maxim. She was nearly destroyed by an accidental fire at Milford in 1905, but was repaired and restored to her work. Now she has had another narrow escape from loss, this time by stranding, when running at 19 knots speed in fog on to the Kains Rock, Guernsey. At first her position looked serious and the passengers had to be taken off. Sensational reports were circulated in the press as to inefficiency of life-saving appliances on board. It is satisfactory therefore to know that the question of the condition of the ship's boats and life belts was thoroughly gone into at the Board of Trade enquiry and that the allegations referred to were pronounced to be totally without foundation. The *Roebuck* is now under repair and will no doubt soon be on her station again.

The Great Western Railway

has, according to a somewhat surprising announcement, made arrangements for the discontinuance of its Brittany service, which is maintained between Plymouth and Brest, and for whose extension there was but recently acquired one of the steamships which had up to that time served on the mail service of the Harwich route. It is further stated that the Nantes service of the Great Western may also be abandoned.

The "Lusitania"

has made a remarkable record in the way of quick turns. In about nineteen days and a half she has steamed some nine thousand miles. This works out, quite roughly, at about 490 miles a day or say over nineteen knots including stoppages. When we remember that these stoppages are terminal not merely halts at ports of call it may well be claimed that the Clydebank built liner has done that which has never been approached by the performance of any other vessel. The epitome of her trips seems to have been as follows:

OUTWARDS

Left Liverpool 4 p.m., 28th August.
Left Queenstown 4 p.m., 28th August.
Arrived Ambrose Channel Lightship (the turning place of the liners) 8.45 a.m., 2nd Sept.

HOMEWARDS

Left Ambrose Channel Lightship 7.40 p.m., 3rd Sept.
Arrived Liverpool Landing Stage, 8 a.m., 9th Sept.

OUTWARDS AGAIN.

Left Liverpool 5 p.m., 11th Sept.
Left Queenstown 10.45 a.m., 12th Sept.
Arrived New York 10 p.m., 16th Sept.

By these means she caught up her turn which had been interrupted by the Liverpool strikes and regained nine lost days. Her stay in New York was now from the night of Saturday, 16th September, till her schedule date of Wednesday, 20th September, for the return voyage. During her stay in New York at the beginning of September, a stay which between the two passings of the Ambrose Lightship was only thirty-eight hours, she not only dealt with the inward and outward crowds of passengers, but in twenty-one hours she shipped 5500 tons of coal, all the needful provisions, passengers' baggage, and had 40,000 pieces of ship's linen sent to the laundry and returned to the ship. Her homeward run was a good one, averaging 24·03 knots and occupying but four days twenty hours and fifty minutes to Daunt's Rock, and her turn round in Liverpool was quite as fine a performance as that in New York. She thus beat the record out and home established by the *Mauretania* some months ago, and having done that established a new and more difficult one by rushing back on a third crossing and effecting it in a time surpassing the most sanguine hopes of those interested.

THE SOUTH STACK LIGHTHOUSE.

ONE of the most interesting of the many lighthouses around the coast is that of the South Stack, off the Island of Holyhead, which is linked to the Isle of Anglesey by the railway embankment. A recent visit impressed the importance of this lighthouse upon us, and imparted double pleasure due to the influence on our memory of a former visit paid during the early part of the American Civil War, the fiftieth anniversary of the first battle of which was recently celebrated. We witnessed then the steaming performance of an intending blockade runner against one of the Holyhead to Dublin mail boats. The Mountain Cliff, at the foot of which, divided by a gorge but united by a suspension bridge, rests the rock whereon the lighthouse stands, is nearly an hour's drive from Holyhead station. The descent from the cliff is by means of about 550 steps to the suspension bridge, under which some hundred feet or so below rush the waters of the Atlantic, mingling with those of the Irish Sea. The scene is magnificent in summer, and one can well imagine the grandeur in winter under the influence of a raging storm, with the terrific waves breaking on the rock-girt shore.

The lighthouse was erected in 1809, when the light was produced by oil lamps, with burners aggregating 16,000 candle power. In 1873 the light was altered, and improved in 1909 to its present

high efficiency. There are about 100 steps from the lighthouse entrance door to the light. The dioptric apparatus, which is six-sided, revolves once per minute and shows bright for half a second, then shaded for nine and a half seconds. The apparatus is supported by a bath of mercury, provision being made for it to be held up on revolving rollers, lest the mercury should escape by any means. The present light is equal to 275,000 candle power, and is supplied by an oil vapour lamp. The foghorn blast is by means of compressed air contained in a reservoir charged by means of a set of Hornsby oil engines. The Mersey Harbour Board has also a reporting and communicating station at the lighthouse. The North Stack is within view of the lighthouse, and is a projecting rock about a mile to the north nearer Holyhead. The breakwater, which was built during 1845 to 1862, is an interesting sight, and forms a protection to the harbour. It is nearly two miles long, with a lighthouse at the outer end, while about two miles outside are the Skerries with the lighthouse upon the island.

The South Stack Lighthouse.

In October, 1859, while homeward-bound from Australia with a large number of passengers, many of whom were returning with their families to the homes they had left years before, the *Royal Charter* was driven ashore and wrecked off the coast of Anglesey. The voyage had been, up to the time the vessel came within sight of Holyhead, a prosperous one, and the survivors from the wreck stated that all had been going well and happily on board, passengers and crew looking forward with eager expectation to their safe arrival in Liverpool, and messages had been sent from Queenstown to waiting friends. In order to give an opportunity to see the *Great Eastern*, then laying at Holyhead, the coast was approached safely enough for fine weather, but when night drew on the wind rose to a hurricane and the ship drifted. The anchors were let go and the engines (auxiliary) kept going to ease the strain on the cables, but all in vain. The cables parted, and the wind and the waves engulfed both ship, men, women and children. There were about 460 lives lost. Most of the bodies were washed ashore and buried in the churchyards around Moelfra Bay. To these a pathetic interest is attached, as one visits the locality.

GALVANIZING AND PLATING.

THE usual course of galvanizing and plating by the application of heat has objections to its use for many reasons, and the introduction of a means of coating metals with a protective covering, without these objections, may be looked upon as most desirable. An opportunity was afforded the writer recently of inspecting a process and the results, which appear to justify the claim that metals may be coated with protective skins without being subjected to influences which tend to injure their initial structure or spoil the surface for fine work. Thus iron bolts and nuts were treated and the deposit of zinc was so smooth and clean that no difficulty was experienced in connection with the threads in screwing the nuts on and off. Brass, coated with tin, and aluminium with brass, were also shown, both in the process and the results. Metal deposited on wood was also shown, and it was explained that the whole art of galvanizing and depositing could be carried out by the process, which has, after much labour and many experiments, been brought to its present stage by Mr. Merino, an Italian chemist and expert, upon whom the mantle of his scientific father has fallen. Depositing of silver or an alloy on earthenware has been treated with great success, judging from the samples shown and the fine polish; and as the strength of the vessels is increased by the addition of the metal, the process promises to be of great value in connection with ships' dining saloons, where a silver outside and earthenware inside tend to a nice show and cleanliness. The treatment of condenser tubes and ferrules by the process is one direction in which some careful tests might be made in view of the corrosive action which takes place. Messrs. Harvey & Co., Ltd., of Norfolk House, Laurence Pountney Hill, have the process under their charge with a view to its development in the various directions of which it is capable, and these seem to be many, when its possibilities in connection with metal, wood and earthenware are considered.

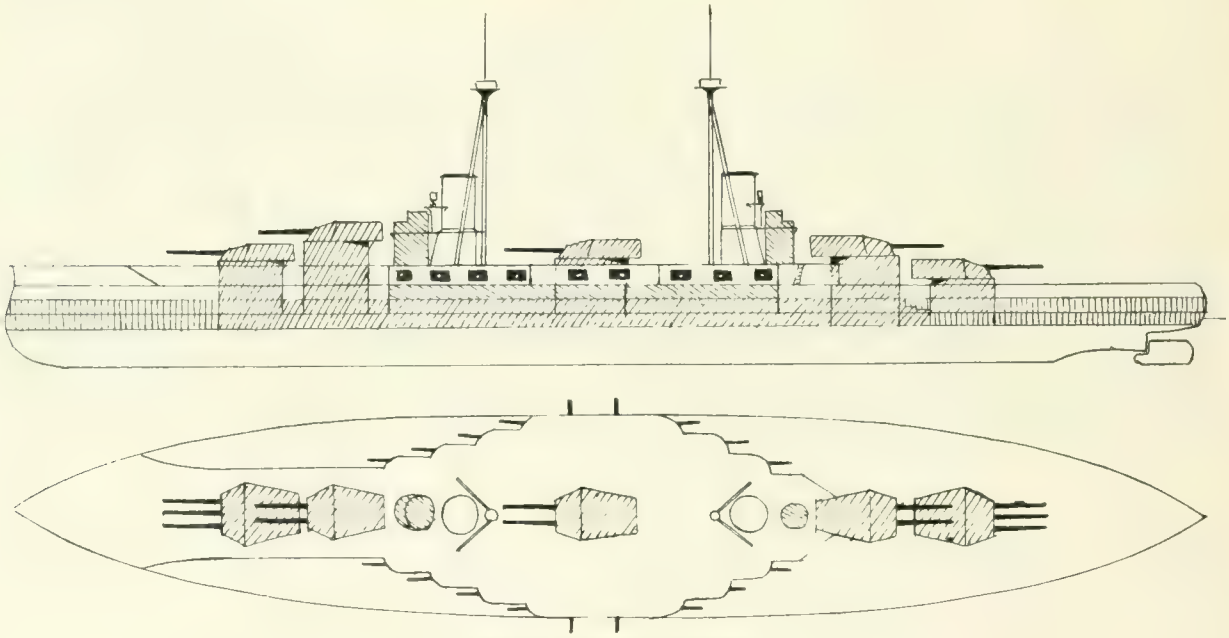
ITALIAN DREADNOUGHT "CONTE DI CAVOUR."

THE *Conte di Cavour*, Italy's second "Dreadnought," was launched at Spezia last August. In design she is quite the most unique of the many and varied types of battleship which come under this heading, and possesses the proud distinction of mounting the most numerous all-big-gun battery yet put into a modern warship, which consists of thirteen 12″ guns.

As may be seen from the plan, these are carried in five turrets, of which two are raised to fire over the fore and aftermost and the remaining one is amidships between the masts. These three lower gun-houses carry three guns apiece, while the raised positions contain the ordinary twin-mounting. All can be trained on either beam, and five axially ahead or astern, giving her a fire concentration of 11,050 lbs. per broadside and 4250 lbs. in the latter directions. For comparative purposes we append a table showing the fire concentration and main details of her contemporaries.

The anti-torpedo battery is carried along the upper deck and consists of eighteen 4·7″ guns, while a tertiary armament of fourteen 14-pounders is distributed over the superstructures and turret tops. These are not shown in the plan, as their exact positions are uncertain. A somewhat novel and original way of spacing the 4·7″ guns has been adopted in order to provide for a heavy end-on fire. The hull side is deeply recessed in a series of steps fore and aft of the two centre 4·7″ ports so as to provide accommodation for four guns forward and three aft per broadside.*

Turning again to the main armament, the actual battle-value of this huge collection of ordnance is a somewhat debatable point. As we have mentioned in preceding articles, the maximum number of guns that can be "controlled" from central range-finding stations is ten. What system is in use in the Italian navy is uncertain, but unless they have some such arrangement of the range-finders as is in vogue in Germany, *i.e.*, one to each turret, whereby the groups of guns would be under five individual controls, it is unlikely that the fullest use will be obtained with the best results from the thirteen guns.



Plan of the *Conte di Cavour*

	Nation.	Displacement in tons.	Speed	Armament.	Broadside	Axial
					(Not including tertiary or 4″ guns)	
					lbs.	lbs.
Orion	Great Britain	22,600	21	10 13·5″ guns 16 4″ ,,	12,500	[illegible]
Arkansas	U.S.A. ..	26,000	[illegible]	12 12″ 21 [illegible] ,,	[illegible]	3,640-3,700 astern
Jean Bart	France ..	23,000	[illegible]	12 12″ 22 5·5″ ,,	10,426	8,156-8,320 astern
Veritus Unitis	Austria ..	[illegible]	21	12 12″ 18 smaller	[illegible]	[illegible]
Sao Paulo ...	Brazil ..	[illegible]	21	12 12″ guns 22 4·7″ ,,	10,695	[illegible]
Heligoland ...	Germany	22,800	20·5	12 12″ 14 [illegible] ,,	[illegible]	[illegible]
Sevastopol ...	Russia ..	23,000	[illegible]	12 12″ 16 4·7″ ,,	[illegible]	2,356
Moreno	Argentine	[illegible]	22·5	12 [illegible] 12 [illegible] ,,	[illegible]	7,010 4,602
Conte di Cavour	Italy ..	[illegible]	[illegible]	13 12″ 18 [illegible] ,,	11,402	4,558 astern

The three-gun turrets are now no longer a novelty, although it so happens that the *Cavour* is the first ship so fitted to be discussed in these columns. In any case they can only be regarded as a weight-saving but risky device employed *faute de mieux* in order to crowd in an increased number of smaller guns instead of substituting fewer guns of larger calibre. The *Cavour* could, and would, doubtless have been armed with ten 13·5″ had these pieces been available in Italy, and for this reason her being fitted with thirteen 12″ can only be looked upon as a temporary expedient to produce a more powerful ship than her neighbours, pending the introduction of the 13·5″, 14″ or even 16″ gun.

The armour protection is somewhat light for a ship

*Current plans incorrectly give her no forecastle deck, and these 4·7″ carried in groups of four, one and four instead of four, two and three.

Launch at the [illegible] of Spezia.

of her size, but taken in conjunction with the armament and designed speed of 22·5 knots with 24,000 I.H.P., it is probably a good deal more extensive than could have been allotted to a similar ship built elsewhere. In our article on the *Napoli* (Aug., 1909), we mentioned in passing the Italian ability to get a better all-round ship on a given displacement than could be produced elsewhere. Where robustness is not the essential that it is to some nations, weight in scantlings, supports and frames can be reduced to what in our own ships would be probably below the minimum, added to which the wholesale use of

As the [illegible] will appear when completed.

asbestos fittings and hollow metal-work wherever possible, and you have a drastic saving in weight which can be utilized in other directions.

On paper the *Cavour* is, with the exception of our "Orions," the most powerful ship afloat, added to which she has a higher designed speed than any battleship built or building, except the Russian "Poltava" class, and could therefore choose her own range in action, and maintain the best manœuvring positions. In practice her lack of displacement must tell somewhere or sometime; either in her ability to stand continuous firing, big-gun hammering, torpedo attack by below-water protection, or seaworthiness and speed-keeping in heavy weather. As she stands, however, the *Cavour* is a monument to Italian ingenuity in weight saving.

The thickness of the belt (water-line) is uncertain, but will doubtless be similar to that of the *Dante Alighieri* which preceded her, *i.e.*, 10″ amidships with continuations 6″ forward and 4″ aft. The protective deck is $1\frac{3}{4}$″ only. An $8\frac{3}{4}$″ strake covers the lower deck side and forms a redoubt, while the battery is behind 5″ armour. The big gun barbettes and turrets have $9\frac{1}{4}$″ protection, and there are two 11″ conning towers of a novel pattern. Details of these are lacking, but from the model of the ship they appear to be three-storey structures and will probably contain the central gun-control stations. The tripod-masts will be a good deal lighter than those fitted to our ships and carry a small observation platform, wireless rig, etc.

It is also reported that the funnel-bases are to be armoured, but no confirmation of this can be obtained. In view of their close proximity to the 4·7″ battery guns, it is most likely that this necessary precaution will be taken against having the flats permeated with smoke and fumes from pierced uptakes.

The *Cavour* class will have their steam generated in Blechynden or Babcock boilers, and be turbine-driven. Their coal supply is not likely to differ much from that of the *Dante Alighieri*, which is normal 1000 and maximum 2500 tons.

British pattern "Bullivant" torpedo-nets will be stowed along the battery deck.

Two sisters, the *Giulio Cæsare* and *Leonardo da Vinci*, are building at the Odero and Orlando yards respectively, and all three ships are to be completed by 1913.

THE THERMO-FEED AUTOMATIC WATER REGULATOR.

EXPERIENCE has shown that uniformity of water level in boilers tends largely towards efficiency of operation and economy of fuel and much ingenuity has been displayed in the design of apparatus for the purpose. In all devices of this nature there must of necessity be a certain range of movement or variation in function in order to get any governing effect at all, for if set too close no operation takes place at all and the device is rendered absolutely inoperative for practical purposes.

We have much pleasure in describing a feed regulator which is being put on the market under the above title by Messrs. Ronald Trist & Co., Ltd., of London and Glasgow, and which possesses distinct claims to merit for ingenuity of construction and simplicity of design. The device is illustrated in the adjoining sectional diagram and consists essentially of three elements, *viz.*: a float chamber with float, a steam and exhaust valve operated by the float and a power device for closing a spring-pressed feed check valve adapted to be normally open. The chamber 2 is connected to the water space of the boiler by means of the pipe 3, and to the steam space by the pipe 4. The chamber contains a float 5 which co-acts with a float lever 17, pivoted at 20 in the control valve casing 11. This valve stem 14 connected to the lever 17 has two oppositely disposed valves 12 and 13, which engage two seatings in the casing 11. A screwed cap 28 on the casing enables those valves to be adjusted in their relative distance from one another and a pipe 27 at the rear of the valve 13 leads to the exhaust, while a pipe 23 connected to the casing at a point between the valves 12 and 13 passes to a diaphragm chamber 24, having a diaphragm actuating in opposition to a spiral spring mounted on the stem of the feed check valve 25. The tendency of this spring is to maintain the valve 25 normally open.

With this simple description it will be readily seen by reference to the diagram how the device works.

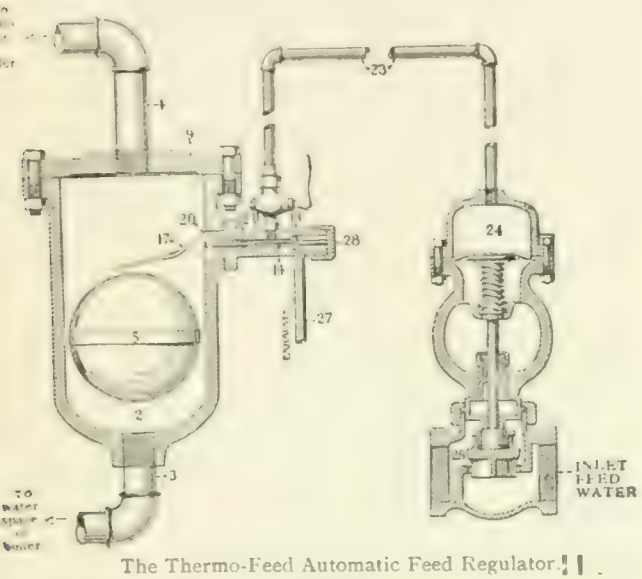
When the water rises above a certain level in the boiler and the float chamber, it will raise the float and float-lever, drawing the controlling valve endwise in such a manner as to close the valve at 13 and open the valve at 12. Steam will then flow through from the float chamber 2 by means of the pipe 23 to the diaphragm chamber 24, closing the check valve 25, thus shutting off the water supply of the boiler. As the water level drops in the boiler, the float 5 will lower and tend to close valve 12 and open valve 13, and allow the pressure which is in the small pipe 23 between the controlling and regulating valve to be exhausted to the atmosphere, and then the valve 25 will open again and the boiler will be supplied with water.

In actual practice the controlling device will be in an intermediate position for the majority of the time, so that both valves 12 and 13 will be strictly open, and a little steam will blow through from float-chamber into the open air. This small escape of steam shows proper working condition, and indicates a substantially constant water level, which is the condition desired. The parts are so simple in form and so easy to adjust that the device may be taken apart or put together by an ordinary mechanic in a few minutes.

The controlling valve arrangement may be removed as a whole by taking off two nuts where it is bolted to float-chamber and pulling it out therefrom, the float lever being withdrawn from float-chamber. The cap 28 on end of controlling valve should then be removed, the valve 13 and lock nut unscrewed. The pin 20 can then be removed from end of float lever, and the valve 12 and valve stem be pulled endwise out of valve casing.

To put the controlling valve together again, replace the valve 12 and valve stem in valve casing, put the fork on the float lever 17 in a slot in the valve 12, then put in the pin 20 in end of float lever; now screw on the valve 13 until both valves 12 and 13 are seated, then turn back valve 13 three-fourths of a turn and the valve will be set.

The three-way cock placed on the pipe 23 leading from the controlling valve to the regulating valve, enables a person at any time to open the regulating valve independent of the float-chamber. In other words the boiler can be fed by hand by means of this



The Thermo-Feed Automatic Feed Regulator.

cock, and thus have a higher water level if desired at any time, for example, when shutting down the boiler.

THE LENTHALL-BAUGH TIDE INDICATOR.

IN our August issue we gave an illustrated description of an extremely ingenious instrument under the title of a "New Tide Recorder" and having regard to the great interest aroused by it we think it desirable to supplement the description so as to more clearly indicate the working of the instrument. As previously stated the arm D to which the hour hand C is rigidly attached is geared to the pointer F, but it must be understood that the gearing is of such a form that the ratio of movement of one to the other can be varied so as to correspond with the variable relations of the height of high water and the half mean spring range. This function is automatically affected when the pointer F is being moved to the height of high water on the tide gauge E, when the hour hand C is in the vertical position. The circular tide gauge E is made to rotate relative to the fixed dial by means of the milled head A. When the instrument is to be used the hour hand is just set to the high water or vertical position and the circular tide gauge E is set by means of the head A, so that the half mean spring range in feet is opposite the arrow on the dial so marked. The indicating hand F is now turned by means of the milled head B so that it is opposite the figure corresponding to the height of high water taken from the Admiralty Tide Tables. The instrument is now ready for use for the particular port and tide for which it is set, and to find the height of the tide at any hour it is only necessary, by means of the handle D, to set the hour hand C to the time from high water, either before or after as the case may be, as indicated on the particular tide scale, either 4, 5, 6, 7, or 8 hours tides, which action simultaneously moves the pointer F round to the figure on the scale E, which indicates the height of the tide at that hour.

With reference to the five scales on the instrument it will be understood that the six-hour scale is the one principally used, but at certain ports the tides are irregular and take rather a longer or a shorter time to rise than to fall, take Southampton for example, and for such ports the other scales are used according to the circumstances.

To give an actual example of use of the indicator, say it is required to ascertain the height of the tide at Pembroke on October 19th, 1910, at 9.45 a.m., the following illustrates the procedure as far as the factors are concerned :—

	Ft.	In.
Half mean spring range at Pembroke ...	11	3
Height of high water (from Admiralty table)	24	6
	hours.	minutes.
Time of high water (from Admiralty table)	6	13 a.m.
Time at which height is required ...	9	45 a.m.
Time from high water	3	32

The tide gauge E of the indicator is set with 11 ft. 3 ins. opposite the arrow and the pointer F is set to 24 ft. 6 ins. On turning the hand C to three and a half hours from high water on the six hours scale, the pointer F will move round to 7 ft. 9 in., which is the height at 9-45 a.m.

The price of the "Mechanical" model is £5 10s. nett, and the "Simple" model £1 1s. nett, and the sole makers are Heath & Co., Ltd., Crayford, London, and 2, Tower Royal, Cannon Street, E.C., who will be pleased to send descriptive pamphlets to those interested.

NAVAL MATTERS—PAST AND PROSPECTIVE.

(*From our Own Correspondent.*)

Portsmouth Dockyard.

THE battleship *Orion* is now carrying out sea trials and by the time these lines appear in print will probably have returned to prepare to hoist the flag of Rear-Admiral H. G. King Hall, who is to succeed Rear-Admiral Patey in the Second Division of the Home Fleet on October 19th. In connection with the gun trials of the vessel which it may be mentioned is the first to mount the 13·5 inch gun a new device has been fitted to the range finders in the protected station of the upper deck, its principal feature being the application of the periscope principle. The battleship *King George V.* is making satisfactory progress and it has been announced that the vessel is to be launched on October 4th by Princess Christian of Schleswig-Holstein instead of by the King as was anticipated. The *King George* will have a much longer run on the building slip than the *Orion* will by reason that vessel but in all essential principles she will be similar. The vessel is being built with great accuracy, no vessels nor any of the officers or men of the yard except those engaged on the ship being allowed to go aboard, even the engineers and even naval officers have to get a pass. It is understood that Her Majesty's yacht the *Victoria*, will shortly be broken up and a new vessel built. The yacht which is a graceful vessel of [illegible] tons and [illegible] horse power has been very fast and [illegible] the yacht *Victoria* Victoria, who [illegible] the [illegible] and the Isle of Wight. Report [illegible] the cruiser [illegible] of the Atlantic Fleet which came in on September 15th for a [illegible]

[illegible] and *[illegible]*. The *Cyclops* of the [illegible] will undergo a refit to prepare her [illegible] the escorting cruisers which [illegible] the King to India. The *Medina*, in which the King and Queen will sail, is to be commissioned at this port on October 16th. The small [illegible] put right are the destroyers *Boxer*, [illegible] *Hunter*, *Mutine* and *Minstrel*. [illegible] which was built eighteen years ago by Messrs. Thornycroft & Co. at Chiswick, and which recently returned from the Mediterranean, is to be sold on October [illegible]. Submarine *A1*, which sank some years ago with disastrous results, appears to have been now lost beyond recovery. Experiments were recently carried out at Spithead with the object of endeavouring to see if a submarine could be located, and she was accordingly sunk, but up to the present it has not been located. Fortunately she had no crew. We had a distinguished visitor on September 5th in the person of Mr. Meyer, the Secretary of the United States Navy Department, who made the round of the naval establishments at the port, including the Gunnery School at Whale Island and, almost needless to say, the *Victory*. He also went up the harbour and inspected the school for boy artificers.

Devonport Dockyard.

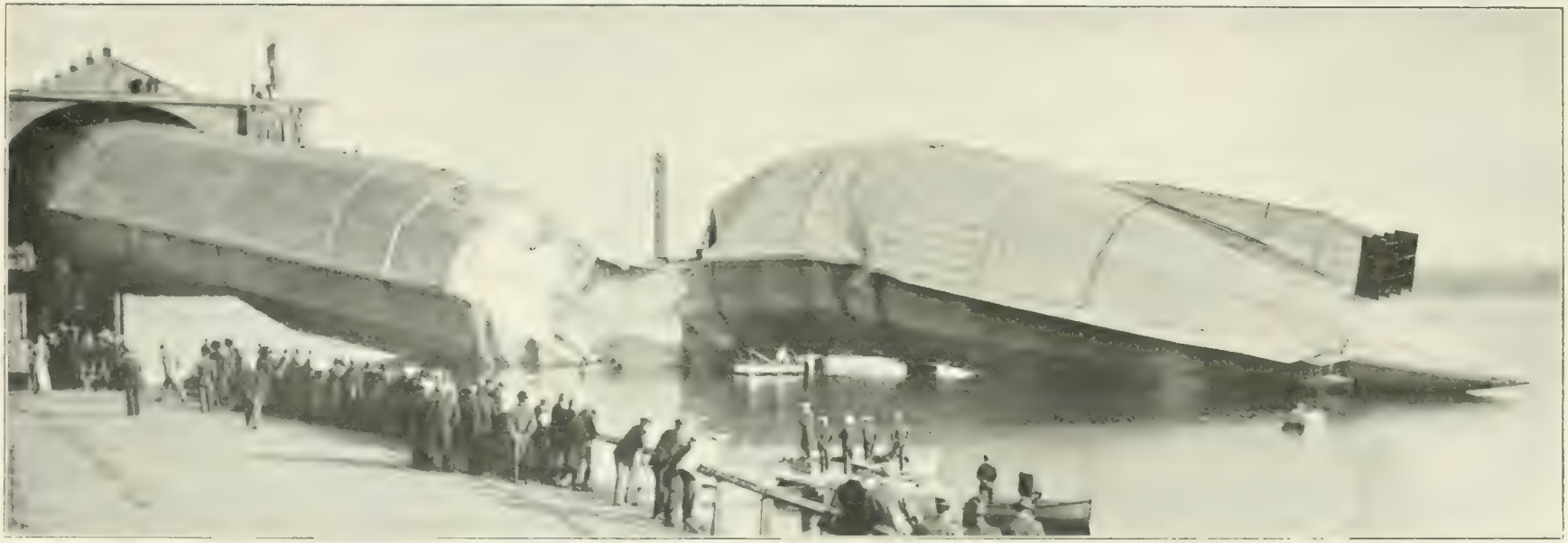
The cruiser *Lion* is now undergoing her preliminary trials, and there is every prospect that she will be ready for commissioning by November 29th, two years from the date she was laid down. In the matter of speed she is expected to make a record for a vessel of her size. The torpedo net defence fittings of the *Lion* are, owing to the great length of the ship, the most extensive yet fitted at this yard. The battleship *Centurion* is to leave the slip during the third week of November and the launching gear is being got ready. Considerable repairs have to be made to the gear, which was last used on the occasion of the launch of the *Lion*, thirteen months ago. The battleship *Colossus* has left to join the Second Division of the Home Fleet. As a result of experience gained during the steam trials of the vessel it was decided to increase the height of the foremost funnel, and the work was accordingly carried out. As originally fitted, the top of the funnel was nearly in line with the upper bridge, rendering that position very unsatisfactory as a navigating platform, owing to the escaping gases and smoke. The refit of the cruiser *Europa* is nearing completion and she has just had four new funnels lifted on board. The vessel is having a most extensive refit, including a thorough overhaul and refit of the main and auxiliary machinery and the boiler installation, while the magazine-cooling machinery has been thoroughly brought up-to-date. It is understood that she will be commissioned for special service when completed. The destroyer *Arun* has completed her refit and the *Electra* and *Coquette* have been paid off in readiness to be taken in hand for retubing and refit respectively. The *Panther*, of the Fifth Destroyer Flotilla, has been docked for the repair of her propeller, which was damaged in collision with Yarmouth Pier. Letters received at the port state that the cadets' training ship *Cornwall* had a narrow escape from becoming a wreck when she struck an uncharted rock at Cape Sable, Nova Scotia, near the spot where the Canadian cruiser *Niobe* grounded. The *Cornwall* nevertheless towed the *Niobe* to Halifax, and Captain Ley has been thanked by the Naval Department at Ottawa and also complimented on his skill and seamanship. Temporary repairs are being effected to both vessels at Halifax dockyard, and it is stated that early in November they will return here for the damage to be permanently made good. The battleship *Royal Sovereign* has been paid off and is to be towed to the Motherbank, where the *Ramillies* and *Resolution*, the first two of the class to be removed from the effective list, are berthed. The new coaling depot at the north-western end of the North Yard will, it is anticipated, be completed early in November. It will be one of the best-equipped coal depots in the world. The Greek cruiser *Georgios Averoff* has left us after a stay of nearly two months. Her repairs entailed the removal of about thirty of the bottom plates and also sections of the main keel. Advantage was taken of the vessel's stay in dock to improve the armament fittings, the alterations being carried out by Messrs. Armstrong, who installed the original fittings.

Chatham Dockyard.

Our new cruiser the *Chatham* is to be launched on November 9th. The vessel, which will be in an advanced stage when she leaves the slip, is being built under the superintendence of Mr. E. R. Bate, senior constructor, who, it is understood, will not remain here much longer, as it is probable that he will be promoted before long. It is not yet known who will name the *Chatham*. No public launch has taken place in the yard for five years, the last big launch having been that of the cruiser *Shannon*. The refit of the cruiser *Cressy* has been completed. The work was of a more extensive character than was at first anticipated, the vessel being fitted with thirty Belleville boilers, the majority of which were in such a state as to necessitate their being almost entirely reconstructed. The engines were also thoroughly overhauled. The cruiser *Dido* has been completed and has been commissioned for service in the Nore Sub-division of the Home Fleet. She has since embarked mechanician classes for training. The new cruiser *Falmouth* has been commissioned at this port for service in the Second Division of the Home Fleet. There is every probability that she will pay an early visit to her namesake port. The battleship *Bulwark*, of the Nore Sub-division of the Home Fleet, was paid off on September 1st for a long refit, for which the sum of £68,831 is provided up to the end of March. There are also in hand the cruisers *Hyacinth* and *Pactolus*, the latter being converted into a submarine depot ship, while four submarines are under construction. The destroyer *Eden* has completed her refit and on September 12th was commissioned for service in the Nore Destroyer Flotilla, which she joined at Kirkwall. The *Grasshopper*, having completed her refit, has proceeded to Fortrose to rejoin the First Destroyer Flotilla, and the *Nubian* and *Zulu* have come in from Fortrose for refitting and docking respectively. Engineer-Captain W. F. Pamphlett, who is on the staff of Vice-Admiral Prince Louis of Battenberg, commanding the Third and Fourth Divisions of the Home Fleet, has been awarded the Good Service Pension of £150 a year which was vacant by the retirement from the service of Engineer-Captain J. W. Hole. Engineer-Commander J. A. Murray, who had been serving since March, 1908, on duty with the captain of the yard, has been placed on the retired list with the rank of engineer-captain, and has been succeeded by Engineer-Commander A. E. Tompkins from the cruiser *Hyacinth*. Captain Murray was almost at the top of the engineer-commanders' list, his rank dating from August 28th, 1898. He entered the service in July, 1881.

Sheerness Dockyard.

It has been announced that the refits of the destroyers serving in the Nore Flotilla are to be jointly undertaken by this yard and Chatham, half being allotted to each establishment, but the change will probably not make any more work for us. The destroyer *Usk*, having had an extensive refit, has been commissioned with a nucleus crew as tender to the *Actaeon* until she is manned with a full crew for service on the China Station. The *Kennet*, which is to go to the Mediterranean to relieve the *Welland* so that that vessel can also go to the Far East, has arrived from Pembroke and is acting as tender to the *Actaeon* for the present. The destroyers *Waveney*, of the Nore Flotilla, and *Recruit* are still in hand, the latter being prepared for service in the Devonport Flotilla. The ocean-going destroyer *Nautilus*, built by the Thames Ironworks Company at Blackwall, was commissioned on September 12th for service in the First Flotilla, the vessels in which are now all turbine-propelled and of the ocean-going type. The delivery of the *Nautilus* was delayed almost a year owing to damage received in a collision when steaming down the Thames for trial. Torpedo boat *No.* 36 met with an accident when at exercises and was dry docked at Leith on September 1st with her bottom holed forward, rudder damaged, and propeller blades chipped, the damage having been caused by the vessel going ashore on Inchkeith Island in the Firth of Forth. Temporary repairs were carried out at Leith and the boat came on here a fortnight later to be thoroughly overhauled and made seaworthy. Torpedo-boat *No.* 111 has been paid off for a refit, and three other boats are in hand—*Nos.* 9, 29 and 30. Submarines *C2*, *C5* and *C6*, of Section III. of the Submarine Flotilla, have arrived to be taken in hand for refit and *C1* and *C4* have been completed and rejoined the flotilla. During the strike this port and Chatham were called upon to furnish six picket-boats for



Photos. Topical and L. N. A.

After an interval of four months the naval airship *Mayfly*, built by Messrs. Vickers, Ltd., Barrow, made her reappearance on the waters of the Cavendish Dock, Barrow, on Sunday, morning the 24th September, and within a few minutes she was a wreck. The top illustration shows the airship practically breaking in half, and the bottom one depicts the wrecked airship being got back into her shed, the gondolas and engine [illegible] under water. It is said that the accident was due to the bursting of one of the central ballonettes or gas compartments which make up the hull additional strain being thus thrown upon the framework, which crumpled up under the pressure. The history of the *Mayfly* has been followed in the pages of this Journal and a full description of the vessel and her first launching in the 22nd May this year will be found in our June issue. The vessel was taken over by the Admiralty on the 22nd September.

duty in the Thames to assist the police on guard duty in the vicinity of the London docks, but twelve hours after their departure the welcome news came to hand that the strike had been settled. Captain G. M. Paine has succeeded Commander Dawson in command of the *Actaeon*, the torpedo school ship. It is understood that part of the establishment will before very long be transferred to buildings previously used as Sheerness Gunnery School, and that further developments are in contemplation. Engineer-Lieutenant W. Briggs, who was recently succeeded by Engineer-Lieutenant G. W. Cannon as assistant engineer in charge of the drawing office, has been appointed to the cruiser *Natal*. Mr. A. W[illegible], master of the tug *Alliance* and Admiralty pilot at this port, has been presented with a silver watch and chain by the Empress Marie Féodorovna of Russia for his services in piloting the Imperial Russian yacht *Polar Star* from Sheerness to the Tongue on the occasion of Her Majesty's recent departure from England.

Pembroke Dockyard.

At length the authority for commencing our new unarmoured cruiser has been received. The vessel, as regards external form and her main fittings, is to be similar to the *Active* and *Amphion*, but she will, it is understood, differ somewhat in her internal arrangements. According to a rumour, which is understood to have an official source, she will have three feet more beam and be fifty feet longer than the two vessels mentioned. Her cost will probably amount to £267,000, of which £76,931 is to be spent on her before March 31st, £11,100 being for dockyard labour. The vessel will be laid down on No. 5 slip, on which the *Amphion* is being built. The latter vessel will not be launched before December, which will be nine months from the time she was laid down. The two shaft tubes, which were delivered a short time ago, on being subjected to water tests were found to be leaky and were condemned, one by the makers and one by the Admiralty. It is reported that the drawings of all the underwater fittings have not yet been approved, and this may cause further delay. The cruiser *Active* has been docked to have her bottom cleared of the angles which were riveted to her for the launch. Her steam trials, which were announced to have taken place early in October, have been postponed. The reason is said to be because the capstan and capstan engine have not yet been delivered, while another probable cause of delay is the non-delivery of the electrical fans for ventilating the engine rooms. The destroyer *Kennet* has completed a retubing refit and has had her propelling and other machinery overhauled. She was commissioned on September 6th and three days later proceeded to Devonport and thence to Chatham. She will shortly be sent to the Mediterranean. The *Itchen* has also completed a retubing refit, which occupied five months. She was commissioned on September 13th by a Chatham crew for service in the Nore Destroyer Flotilla, which she has since joined. The completion of the *Kennet* has permitted the refit of the *Quail*, which has arrived from Devonport, being put in hand. Her refit is to be thorough, both as regards the hull and machinery and boilers. The refit of the destroyer *Locust* is also being carried on, it being confined to the boilers and engines, a thorough refit of the hull having quite recently been carried out at Devonport.

BACK TO THE LAND.—The views which have been advanced and advocated for some years to the effect that shipbuilding should be restored to the Thames have become more concentrated within recent weeks under the auspices of those specially interested in the neighbourhood of the East End of London and its general well-being, with its citizen army. It is curious to watch how the case is looked at from the point of view of the army of workers and its self-elected officers who are doing their utmost, and to some extent succeeding, in their efforts towards drawing away from the Thames the work still remaining. The local strike of ironworkers and the demands they have made are not calculated to encourage the revival of an industry, which those of us who saw its outlets fifty to sixty years ago look back upon with regretful reminiscences, fearing that the spirit which then played havoc with it, and crushed some of the master minds who with painstaking efforts had developed it, is still around the mid reaches of the Thames, the lower reaches and South-nd may afford possibilities.

The rent in the starboard quarter of the *Olympic*. *Photo. C.N.*

THE "OLYMPIC" IN COLLISION.

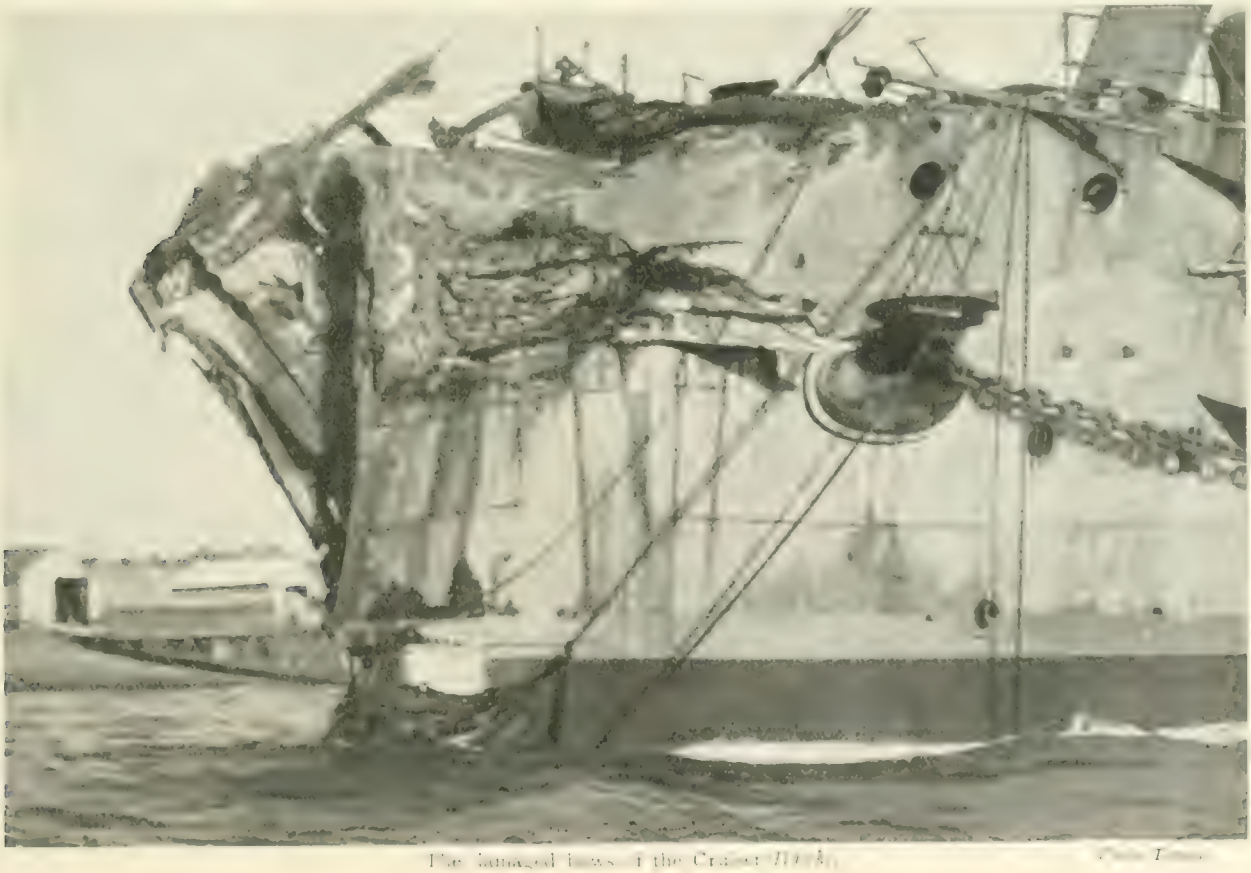
THE White Star Liner *Olympic* and the first class cruiser *Hawke* were in collision off Castle Point, Cowes, on the 20th of last month. Both vessels were proceeding towards Spithead, the cruiser being behind the *Olympic*. She gradually overhauled her, and struck her a violent blow on the starboard quarter. Tugs were immediately signalled, and the *Olympic* was eventually towed back to Southampton. The cruiser had just completed steam trials after a thorough overhaul at Portsmouth. The *Olympic* was carrying over 2,000 passengers at the time of the collision, and counting the crew there were nearly 3,000 souls on board. Her draught shortly after the collision was about 30 ft. forward and 40 ft. aft. The cruiser had her bows stove in, but arrived at Portsmouth later in the afternoon under her own steam, going stern first. A rain squall prevailed at the time of the collision, but the conditions were not such as to obscure either vessel's view of the other. The damage done to the *Olympic* consists in a large slanting hole in the starboard quarter near the stern, It is a great jagged triangular hole extending nearly to the water line, measuring about 15 ft. by 10 ft. The stout plating has been crumpled like paper and forced into the ship for 5 or 6 ft. On the water-line is a smaller hole. As soon as the *Olympic* was berthed divers were sent down and they reported that the vessel had sustained great damage below the water-line, a hole 30 ft. in length being discovered.

The damage to the *Olympic* is being temporarily repaired as quickly as possible, and on completion the vessel will proceed to Belfast to dry dock, and be permanently repaired there.

The *Hawke* has been dry docked at Portsmouth, and an unexpected amount of damage has been revealed. Practically the whole of the cruiser's ram and her stem casting has been torn away. Some 12 ft. of the upper deck is twisted, her plating ripped open and her bows, from the force of the slantwise impact, twisted round to starboard.

A curious legal point, and one of much consequence to shipping companies, is likely to be thrashed out in the Law Courts at an early date. The men are claiming a month's wages under Section 162 of the Merchant Shipping Act. They were offered pay for three days, covering Wednesday, Thursday and Friday, as they ceased work on Friday evening. This they have refused, and the question at issue turns on the legal point as to whether the *Olympic* is a "wreck," in which case the Company's action would be upheld. A similar case does not appear to have arisen, and the parties concerned intend thrashing the matter out in a friendly manner so that the point will not again be in dispute.

It is unfortunate that the ship should be compelled to leave the port on account of lack of dry dock accommodation. The Trafalgar dry dock is undergoing reconstruction, and the work is of a very difficult nature, but no time is being lost, and when completed the dock will be able to accommodate vessels of even greater size than the *Olympic*. The *Olympic* left the dock on this occasion an hour earlier than on previous sailings, for the reason that the tide served best then, and the officials decided to take every advantage offered for swinging the vessel. A deputation from the Harbour Board witnessed her departure, as the matter of marking the swinging ground has been under discussion by the Board, and it is under consideration whether lights or buoys shall be utilized for the purpose.



The damaged bows of the Cruiser *Hawke*.

THE STEAM ENGINE INDICATOR.

Its History and Application.

THE steam engine indicator occupies a place in the long list of inventions handed down to us from that illustrious father of the trade—James Watt. The original idea of the indicator was to register the steam pressure in the cylinder at all points of the stroke and hence to enable the rate at which the engine was doing work to be known. Even to-day that is its chief function, but it tells us also scores of other things—about the setting of the valves and the condition of their working faces, the condition of the piston rings, the amount of compression, the terminal pressure, the power distribution throughout the various cylinders and so on. This little instrument is, without exaggeration, the key to the behaviour of the steam and therefore to the economical working of the entire plant.

Watt's primitive indicator consisted essentially of a cylinder of about one inch diameter, which could be connected to or disconnected from the engine cylinder at will by means of a tap at the bottom of the former; a piston was carefully fitted into this and from the top of this piston a small rod passed vertically upwards through a guide and terminated in a pencil arrangement for describing the diagrams. Between the piston and the small vertical guide a spiral spring of known strength encircled the piston rod. The pencil was made to bear on a sheet of paper fixed to a board which slid in a guiding frame backwards and forwards, always "in step" with the engine piston—*i.e.*, when the engine piston was at the extreme end of its stroke the board also had traversed its full course in one direction, and when the engine piston was at ·4 or ·5, etc., of its travel the sliding board found itself in that same relative position. Watt derived the sliding motion of the board from one of his parallel motion radius rods by means of a cord made to connect these parts. To the other end of the board he attached another cord which passed over a pulley and then had a weight suspended from its lower end. The function of this second cord carrying the weight was to keep the driving cord always in tension. When the pressure in the indicator cylinder remained constant (*e.g.*, atmospheric pressure), and the board was made to reciprocate, a horizontal line was drawn on the paper on the pencil being applied to it. In the same manner, when the driving cord was disconnected and the pressure inside the small cylinder was altered, the application of the pencil to the paper produced a vertical line. It was the combination of these two motions that formed and that still form that celebrated outline termed the "indicator diagram."

Watt's indicator, although, no doubt, a heavy and clumsy piece of mechanism, was quite in place and all that the engineering world of that day was ready for. It involved all the elements necessary for giving a diagram to tell to what advantage the precious fluid was being utilised—yea, in its simple structure were embodied nearly all the principles of our most modern instruments by the best makers of to-day.

The next important step in indicator manufacture was taken by McNaught. He discarded Watts' sliding board arrangement and put in its place a vertical, cylindrical barrel. The paper was wrapped round this and held fast by a clip at each end. The driving cord now made the barrel rotate backwards and forwards about its axis and a volute spring placed inside was used to keep the string in tension. McNaught also continued the walls of his cylinder upwards, thus enclosing the spring, and he attached his pencil arrangement to the bottom of this latter. From these few lines it will be observed that this instrument was much more portable and compact than Watt's; hence it came far more into every-day use than ever its predecessor had done.

The man who now introduced a new design of indicator into the market was Richards—an American. His was a vast improvement on anything that had hitherto come into use. With the McNaught and other early indicators, if a decent-sized diagram was desired, a very weak spring had to be used and hence the piston had to move through a considerable distance. Now, with the sudden rise and fall of pressure in the cylinders of many engines at the beginning and end of the stroke respectively, the reciprocating parts of the indicator had acquired considerable momentum before they reached the point of equilibrium between the force exerted by the spring on the top of the small piston and that set up by the steam pressure below. The result of this was that the pencil, instead of coming to rest immediately at the desired height, carried out a few jerky movements on either side of it and as the horizontal motion of the paper was simultaneously going on these vibrations of the pencil produced irregularities in the curve. With the McNaught indicator it was possible to get a smooth curve by the use of a strong spring, but then the diagram described was so small that it was of little practical value. Richards saw that a strong spring and a short stroke should be employed. He fulfilled these conditions and multiplied the piston movement at the pencil point four times by means of a system of levers. In this respect all modern designers have followed suit.

Although it is now close on fifty years since the Richards indicator first came before the public, it is to-day, in its improved form, the chief favourite with many experienced engineers for every-day use on engines running as fast as 120 or 140 revolutions per minute. Of course, many engines of this period run much faster than that, and then, with the Richards indicator, the old vibration objections crop up again, so that it, too, in turn, is being rejected in favour of newer and finer instruments. Prominent among these modern indicators are the Thompson, the Crosby, the Tabor and the McInnes-Dobbie. The pistons of these have strokes of about $\frac{3}{8}$-in. or $\frac{1}{2}$-in., while the vertical movement of the pencil is generally six times that amount. Their piston springs are all of the double-coil type. This enables the spring to exert its pressure equally at two points on opposite sides of the piston, instead of on one side only, as is the case with the single-coil spring.

The moving parts in the Thompson indicator are much lighter than those of Richards'. This improvement has been safely carried out owing to the neat arrangement of levers in the former. Several modifications of this instrument are now on the market. For very high pressures it may be had with a very

*Prize Essay by "Rocklight" (Mr. J. D. Boyle), written for the Ritchie Award—Graduate Section, Institute of Marine Engineers.

small piston area, while for specially high speeds a smaller size of rotating drum may be used.

The Crosby indicator has a very light and compact multiplying gear so that this instrument is specially adapted for high speeds. The double-coil spring carries a ball at its lower end, which fits into a socket at the top side of the piston; this forms a very neat connection and is much lighter than the usual brass collar arrangement.

In the Tabor indicator radius links have been done away with and a vertical plate with a curved slot in it acts as a guide. A small roller fixed to the pencil lever moves in this slot and the design is such that the line of motion of the pencil point is always parallel to the axis of the paper drum.

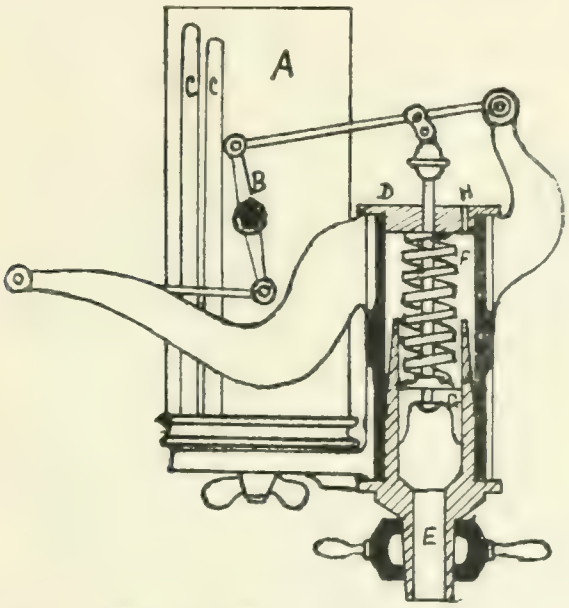


FIGURE 1. RICHARDS INDICATOR.

A.—Revolving Drum. B.—Pencil Parallel Motion. CC.—Clips for attaching paper to Drum. D.—Cylinder Cover. E.—Steam Passage from Engine Cylinder. F.—Spring. G.—Piston. H.—Hole to allow of free escape of any steam leaking past piston.

Up to the present time, as far as every-day use and ordinary wear and tear instruments go, Messrs. Dobbie, McInnes, Ltd., seem to have said the last word in indicator manufacture. In their latest designs the parallel motion gear and other moving parts have been reduced to the limit in weight consistent with strength and rigidity. The parts exposed to heat are sheathed in vulcanite—this enables the instrument to be handled much more comfortably. The piston spring is away from the cylinder and well-exposed to the temperature of the atmosphere; as the strong springs used in this twentieth century are considerably weakened by having their temperatures raised, this change is, without doubt, a step in the right direction. Like a few other modern manufacturers this Company has inserted a strong, adjustable spiral spring inside the cylindrical drum in place of the volute spring introduced by McNaught many years ago. A case hardened, practically non-expensive, steel piston, with a special arrangement for lubricant and the accumulation of dirt, is fitted in this type of indicator. It possesses also a very large connection to the engine cylinder—hence there is no excuse for the passage becoming choked up.

When the indicator is to be used it is generally screwed on to a three-way cock which is fixed to a pipe connecting the two ends of the engine cylinder. As has already been mentioned, the indicator barrel must move always "in step" with the engine piston; hence the cross-head is the favourite part from which to borrow a motion for the former. Fig. 2 is an illustration of one of the commonest forms of reducing gear. The motion here imparted to the barrel is hardly an exact duplicate of that of the cross-head, but provided the radius link is fairly long and the driving cord not too short either, the error arising from the use of this motion may easily be neglected. The cord is connected to the driving pin as shown and

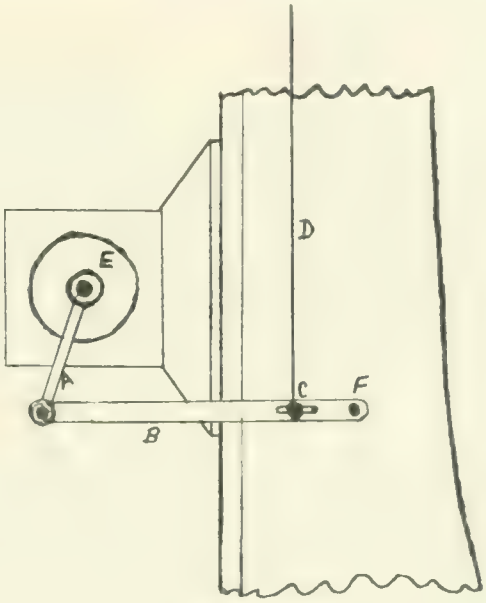


FIGURE 2.

A.—Radius Link. B.—Indicator Driving Lever. C.—Driving Pin (fixed in lever slot). D.—Driving Cord. E.—Engine Crosshead. F.—Fulcrum pin (fixed to column) about which B swings.

thence to the indicator. It is adjusted to its proper length—so that the barrel rotates an equal amount on either side of the pencil—by means of a clip. A simple form of clip is shown at Fig. 3: it consists of a plate, generally of brass, with three holes in it. The cord is passed through the holes as illustrated and a hook on the end of the piece of cord attached to the barrel is slipped into this upper loop.

The indicator is generally heated through to begin with, then the three-way cock is opened to the atmosphere and the atmospheric line is described by the application of the pencil to the paper. The instrument is now connected to first one and then the other end of the cylinder and thus diagrams from the two sides are described. These "cards" show the work done during each of the two different strokes of the engine, or taken together, they tell the amount of work the prime mover is doing per revolution—hence the power is easily calculated.

If too great a "drop" of pressure is occurring between the boiler and the cylinder, the indicator may be applied to the steam chest or to some other part in the passage of the steam between the two first mentioned spaces, so that the position of throttling may be spotted and steps be taken to have things rectified. During the taking of a steam chest diagram the motion of the barrel should be exactly the same as when the instrument is being applied to the cylinder in order that the points of maximum and minimum pressure, etc., in the chest may be accurately noted. The indicator, of late years, has been used also to give diagrams off various types of pumps.

Many new types of indicators have lately been patented and brought into the market. Some of these are almost perfect instruments. Their chief departure from the old lines is that a beam of light, which is cast from a lamp by means of a system of mirrors on to

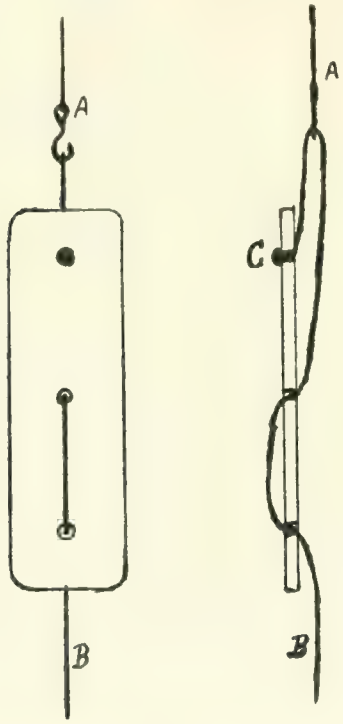


FIGURE 3.

A.—Hook Connection to Indicator B.—Connection to Driving Pin. C.—Knotted end of Cord.

the paper, moves up and down and shapes out the diagram. The engineer, however—at least the British engineer—delights more in things mechanical than in purely scientific arrangements, and that explains, perhaps, why we do not see these magic pencils of light, instead of those ordinary metallic points, focussed on the diagram paper in every large and important engine-room, both ashore and afloat.

So we see that the indicator, like its parent the steam engine, has had quite a varied life during the last few score years. Watt got it to slide along, McNaught made it go round, Richards made it go smoother and faster, and our experts of to-day are still attempting to accelerate its speed without increasing the momentum produced in the moving parts.

"ROCKLIGHT."

CLYDE TRUSTEES.

River and Dock Improvements.

THE annual meeting of the Clyde Trustees for finally examining and settling the accounts for the year ending 30th June last, was held in the Hall of the Trust, Robertson Street, Glasgow, on Sept. 5th, and in the afternoon the Trustees embarked upon the steamer *Duchess of Argyle*, which conveyed them on their annual inspection of new works to various parts of the harbour and docks. Sir Thos. Mason presided at the annual business meeting, at which it transpired that last year's revenue had been the largest in the history of the Trust, amounting to £577,322 5s. 2d.—exceeding the previous year's revenue by practically £22,000. The extra expenditure necessary to obtain this increase only amounted to £5490. More satisfactory still, the surplus revenue last year amounted to £71,933 0s. 6d., and compared with the previous year showed an increase of £16,500. An increase in the tonnage of vessels arriving at and departing from the port of 143,000 tons over the previous year, gave them an increase of revenue amounting to £3400; while an increase over the previous year in tonnage of goods, imported and exported, amounting to 262,000 tons, accounted for an increase in revenue of almost £10,000. The estimate of capital expenditure for last year was £132,292. The actual expenditure incurred was £78,048. Among the larger items of expenditure were £31,000 on Rothesay Dock, making a total capital expenditure on that undertaking to June 30th last of almost £570,000, exclusive of land. A further sum of about £20,000 would be required during the current year. On Yorkhill Quay £10,000 was expended, making a total capital expenditure to date of £260,000, on that work, which was now practically completed. The estimate of the capital expenditure for the current year amounted to over a quarter of a million sterling of work, which, as far as was possible, however, would be revenue producing when completed. £30,000 had been allocated to the new granary at Meadowside; £104,310 would be required for a new dredger and four new hopper barges, which additional plant would hasten the dredging of the channel to a still greater depth.

On the tour of inspection in the afternoon, the new quays and sheds at Yorkhill and the operations in connection with the construction of Govan high-level ferry first came under observation. At Yorkhill it was noted that the new berthage was fully equipped and was proving a most valuable addition to the harbour. On the other side of the river the London and Glasgow Company have constructed a fitting-out basin on the site of the yard formerly occupied by Messrs. Robert Napier & Sons, and now new vessels built by them do not require to be in the river. The works now in progress will do away with the chain ferry at Govan and its trying inclines, and there will be substituted an elevating deck ferry similar to those already at Finnieston and Whiteinch.

The company then landed at Meadowside to inspect the new sheds there and the site of the new granary. The quay wall at Meadowside is the latest and one of the finest in the harbour. It has a length of 1616 feet and is designed to afford a depth of 28 ft. at low water, and about 40 ft. at high water spring tides. The shed is 1640 ft. in length by 100 ft. wide, and is divided into three sections. The granary will be 312 ft. long by 72 ft. wide inside, and 14 storeys in height. There will be accommodation for 20,000 tons of grain in silos and 11,000 tons on floors. The contract for the machinery has been placed with Messrs. Spencer & Co., Melksham, Wilts, but the contract for the building has not yet been decided upon.

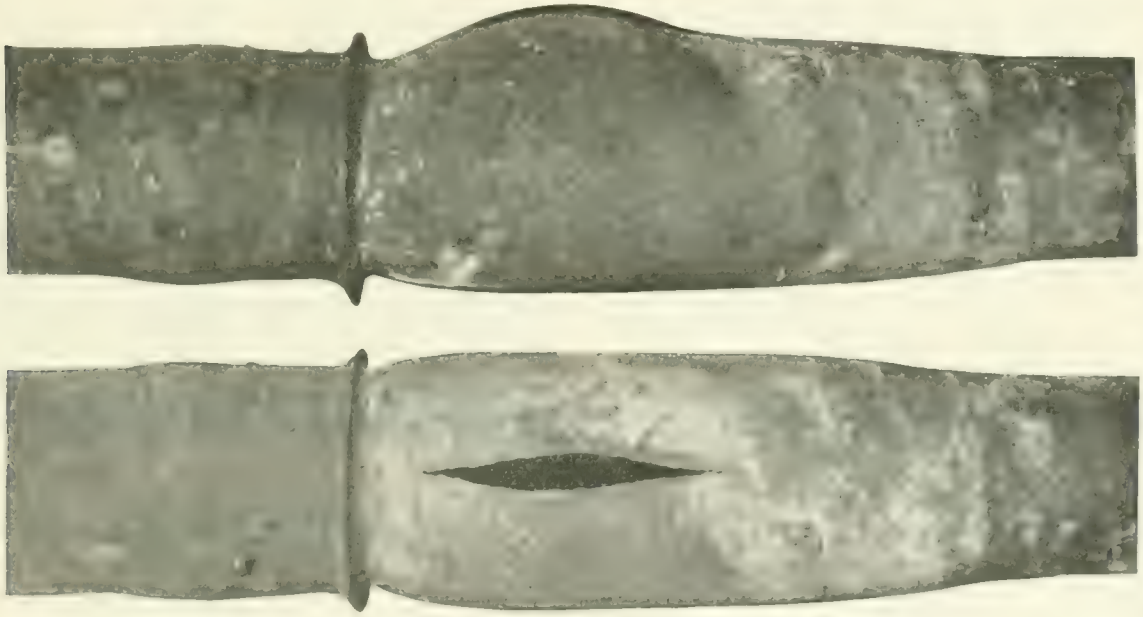
Proceeding down the river, the vessel steamed slowly past the dock lands of Shieldhall, Shiels, Braehead and Elderslie. On the Elderslie grounds there were seen marked out the basins and large graving dock, the construction of which was sanctioned by Parliament this session. The basins will have a water area of about 32¾ acres and a depth of 30 ft. at low water and over 40 ft. at high water of spring tides. The dimensions of the graving dock are to be such as to enable it to accommodate the largest war vessels and mail steamers likely to be built for a long time. In addition to these works

the Act of this [illegible] authorized the Trustees to acquire and re-model Renfrew Ferry. In place of the existing chain ferry there will be substituted [illegible] to those at [illegible] and Whitemich. On the south side the recess will be set back and the river will be widened in connection with the intended large works to the eastward of the ferry. Under this Act it is also intended to reconstruct the west side of Renfrew Harbour, widen the Ferry Road, and bring in a new connection from the Glasgow and South-Western Railway, Renfrew branch.

At Rothesay Dock, Clydebank, into which the steamer sailed, an additional set of engines has been installed in the engine-house; two more coaling hoists, making four in all, have been erected and brought into use on the north quay of the inner basin, while on the south quay of the same basin the two transporters for handling ore have been completed. After leaving Rothesay Dock, the steamer proceeded down the river, and attention was drawn to the important widening of the channel along Newshot Isle. This work, along with the other widenings, was authorized in 1904. The portions at Blythswood and Inchinan were completed in connection with the launch and passage to sea of the *Lusitania* in 1907, and the portion along Newshot Isle is now being done in connection with the new Cunarder *Aquitania*, which is at present being built at Clydebank. The widening has a length of about [illegible] ft., and an area of about [illegible] acres, and the width added to the waterway will vary from [illegible] ft. to [illegible] ft. The trench for the river dyke is excavated, and the whole of the material will be dredged and carried in hopper barges to the place of deposit in the sea off Garroch Head.

BURST DECK STEAM-PIPE.

THE illustrations shown are from photos of a deck steam pipe. They are interesting of themselves, and especially so in view of the article in last issue, dealing with bends and droops in steam pipes, with a view to show the best system of drainage to prevent water hammer action. It will be seen that the pipe illustrated has enlarged considerably before actually opening up, showing that the copper was ductile. The valve for opening steam to this pipe was some distance away, as was also the shut-off valve for this particular section. Probably the steam was opened to the pipe when partly filled with the water of condensation from previous use, and the opening of steam, it may be suddenly, and not gently—contrary to the chief's orders, we can safely add—set the mass in motion, gaining momentum in its course, till the force was enough to enlarge, and then, as the material thinned down, to burst it open as shown.



Views of Burst Deck Steam Pipe.

EXAMINATION OF ENGINEERS.

THE following instructions to examiners and notices to candidates have been recently issued by the Marine Department of the Board of Trade.

The attention of the Board of Trade has been drawn to the circumstances attending the death of a [illegible] on a British ship. The man attempted to remove a manhole door of a boiler in which a vacuum existed, and was drawn into the boiler and so seriously injured that he died the same day. Examiners should be careful to direct the attention of candidates to these occurrences at the [illegible] examinations for First and Second-Class Certificates, questioning them as to their appreciation of the great importance of engineers taking [illegible] themselves that there is neither pressure of steam nor a [illegible]

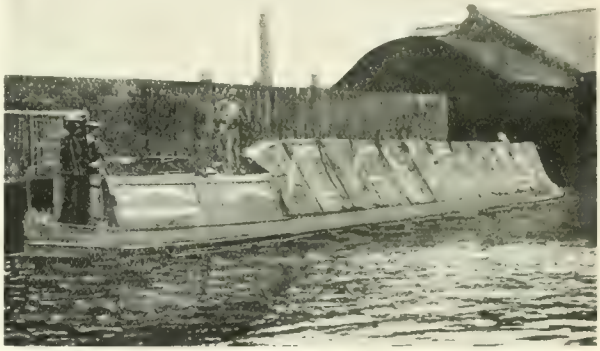
In future, candidates for extra first-class certificates may [illegible] if they so desire. In allowing the use of such tables, examiners should be particularly careful to see that they contain no notes, formulæ, or other information, either printed or written, apart from the actual tables of logarithms and trigonometrical [illegible] any tables which the candidates propose to use should be examined to see that no other matter is contained in them.

THE H.M.S. *Jackall*, a 268-knot [illegible] W. Hawthorn [illegible] Government. The propelling machinery, which [illegible]

CANAL TRAFFIC MOTOR BARGE.

THE illustrations show the first cargo motor barge placed on the canal by a recently-formed company, with the object of testing the feasibility of developing the traffic between London and the provincial towns. The experimental runs to Birmingham have been satisfactory, and it is expected that a regular traffic will be instituted, and prove a great boon to districts on or near the canals which branch into London waters. The barge is of the usual picturesque type, with the special fittings and accommodation, which form so interesting a feature in these vessels. The driving-power is obtained from a 10 H.P. Brooke paraffin engine, Fig. 1, as illustrated. It is fitted aft with the starting and reversing lever, so placed that it can be manipulated by the steersman. The desiderata for an engine to be run for a lengthened period beyond the ken of the workshop and the expert, have been steadily kept in view by Messrs. Brooke in the design and construction. The engine works on the "Otto" principle, and is made as simple as possible, with the working, and especially the vital parts readily accessible. The engine is started up neither by petrol nor compressed air, but by heating the head by means of a blow-lamp, and when started, the lamp is laid aside, the engine being then capable of control without further heating up. The governor manipulates a small by-pass valve shown in Fig. 2, which controls the supply of oil to the cylinder, and may be regulated to suit the desired speed, the glass indicator shown on the engine indicates the passing oil due to the governor action, and is thus a valuable adjunct. The fuel oil pump is driven by a cam, the discharge is through a non-return valve to the spraying jet situated in the hot head of the engine. This pump and connecting gear are so fitted on a bracket that the whole can be readily disconnected and replaced when required for examination and overhaul; included in the details is a regulator for setting the amount of oil to the pump, to suit the load and working conditions of the engine. The starting valve handle is so fitted that it is within easy reach of the fly-wheel, and can be readily touched by the hand of the chargeman when starting up. The lubricating oil pump is driven by gear; the lubricant is forced through a strainer to an adjustable valve, thence to the bearings; after doing its duty, it collects in a receiver, which admits of being readily supplemented, in the crank chamber, ready for another turn; a pressure gauge is fitted to show the pressure of the lubricant. The reversing gear, Fig. 3, is an interesting detail; it is of a simple epicyclic type. For going ahead, a clutch is used composed of beech blocks compressed between two cast-iron plates, and is operated by means of a sliding cam B, which raises the two arms C and forces the surfaces together through the two adjusting screws A. For the astern, the other casing D is held by a brake band E, which is compressed by means of a double-threaded screw F, thus bringing the gear wheels, enclosed in the casing, into operation. The parts which require cleaning from time to time are readily accessible, such as the spraying jet, the non-return valve, the by-pass valve and the oil strainer. A good deal of traffic passes through the canals by the towage of barges, but there is great room for development, and a thoroughly organized regular service which can be

relied upon for despatch and delivery of goods, would, no doubt, obtain sufficient custom and patronage to make it a commercial success. The length of the barge is 71ft. 6ins, beam 7ft., draught with 30 tons loaded, 3ft. 6ins. She has been proved capable with the 10-h.p. oil engine of towing another barge of



similar dimensions loaded, and can pass over practically all the canals of England. During the past summer, owing to the continued absence of rain, the draught of water in some sections of the canals has been somewhat of a detriment, but with the prospect of a steady traffic before the canal authorities this might be obviated. The name of the Company is "The Canals' Motor Navigation Syndicate, Ltd.," of Norfolk House, Laurence Pountney Hill, London, E.C.

Views of the Canal Motor Barge and its Launching
Length, 71ft. 6in.; Beam, 7ft.; Draught with 30 tons loaded, 3ft. 6in.

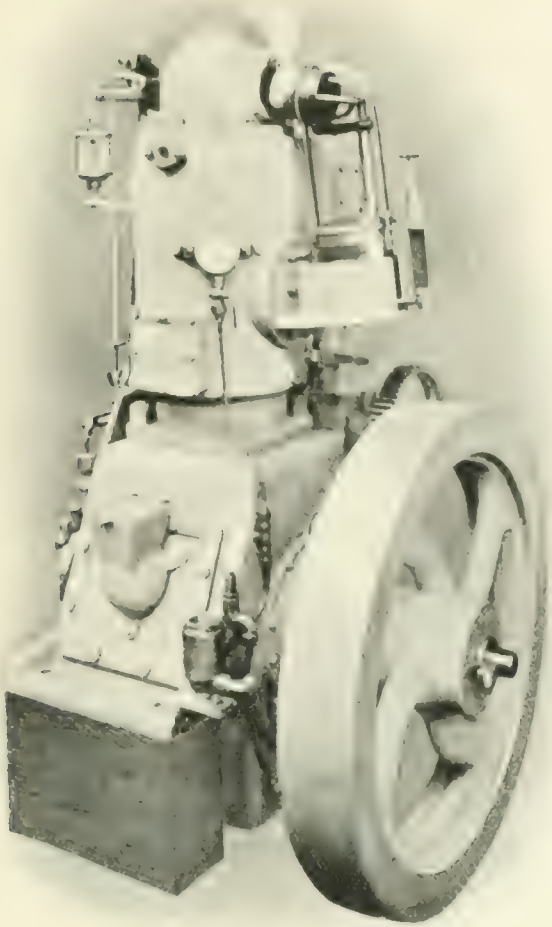


Fig. 1

Fig. 2

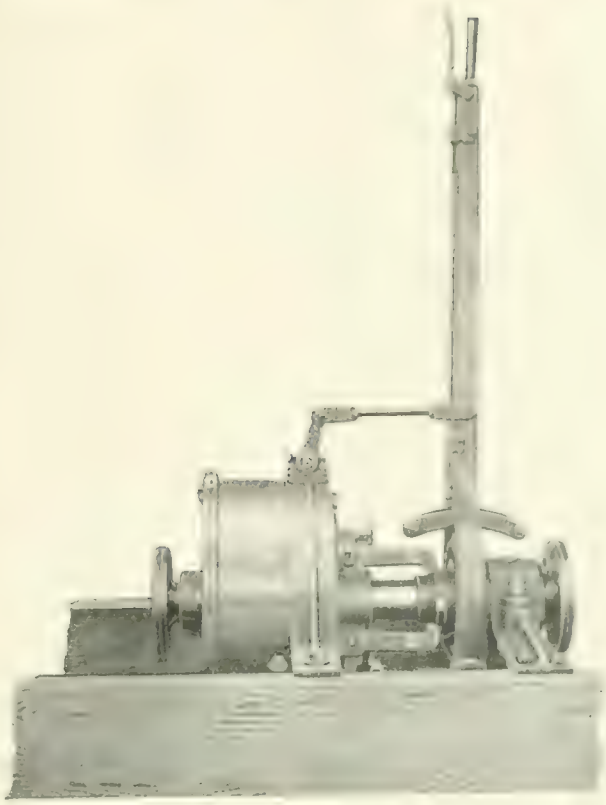


Fig. 3

BRITISH ASSOCIATION.

WE have pleasure in placing before our readers abbreviated reports of some of the papers read recently before the Engineering Section in the latter part of the Portsmouth Meeting of the British Association for the Advancement of Science.

THE ROLLING OF SHIPS AT SEA.

By Prof. J. H. Biles, LL.D., Etc.

The address delivered by Professor J. H. Biles, as President of the Engineering Section, dealt with some questions concerning the rolling of ships at sea. He remarked that engineers had thought that if a vessel had a certain metacentric height and a certain range of positive stability she was quite safe from the action of a series of waves of any kind known to exist, but the occasional mysterious disappearance of ships in circumstances which led to the assumption that they had capsized rendered it desirable to review the grounds of this belief to see whether there was any known possible combination of circumstances that might cause disaster. After describing the investigations on the problems of rolling carried out fifty years ago by Mr. W. Froude and at a later date by Mr. R. E. Froude and Colonel Russo, of the Italian Navy, he mentioned that it had been his intention to bring before the section the results of an experimental study on lines similar to those followed by the last-named investigator, but extended to a wide range of types of ship, waves and resistance; but though the apparatus was practically complete an accident had incapacitated him from carrying out the work proposed. In con-

clusion he thought enough had been said to show what a field of investigation was open to the experimenter. The little done and published by Colonel Russo was only for three battleships of about the same size. For the great bulk of the ocean wayfarers nothing had been done. If it was possible to determine the kind of rolling likely to take place under stated conditions, it seemed desirable to do so. In all that had been said it would be seen that it was possible to determine experimentally the kind of rolling which would take place in a ship which was snug and seaworthy. But it was also possible to study the effect of loose water in a ship under the same set of conditions as to waves, lading and form of ship. This part of the subject had not received any experimental treatment except in a very limited number of full-sized ships. It was quite conceivable that some conditions of loose water associated with some conditions of sea might produce large angles of inclination. The subject had been treated as one in which it was probable that the kind of waves met with at sea would be uniform in size and period. That this was not so was a fact with which every one was more or less familiar. The effect of a uniform system of waves was rapidly to induce a condition of uniform rolling. But any deviation from uniformity of sea immediately introduced non-uniformity of rolling, and generally greater extreme angles of roll. Any experimental study of the action of waves upon a ship must include a variation in the character of the waves. The field of investigation was thereby widened, and the search for large angles of inclination made more laborious. But the work was of a kind which could be done by many people, and could be done fairly rapidly, so that there seemed to be no insuperable objection to doing it.

ON ELECTRIC DRIVES FOR SCREW PROPELLERS.

By Mr. H. A. Mavor.

The problems of marine engineering have until recent years been solved by the application of various forms of the reciprocating steam-engine, and the form, power, speed and general arrangement of power-driven vessels have been developed in connection with this means of propulsion. The advent of the steam turbine and more recently of the explosive type of reciprocating engine has opened up new lines of development, and in certain departments there is evidence that these lines involve the use of intermediate devices between the power-producing and the power-absorbing elements of the machinery. The necessity for these devices arises when the properties of the propeller in respect to the best rate of revolution for the highest economy are incompatible with the same conditions as applied to the requirements emerging from the power generator. The divergence in these properties may be very small or it may be very great. If the divergence be small, there is generally little or no advantage in respect of fuel economy to be gained by the interposition of a transmission arrangement, with its necessary mechanical or other losses; but even in such cases it may be that the transmission arrangement otherwise unnecessary may provide means of dealing with requirements which the steam turbine or internal-combustion engine are incapable of meeting. For example very rapid manœuvring at full power requires in the case of the steam turbine a separate or partially separate reversing equipment, and in the case of the explosive internal-combustion engine the most convenient device hitherto produced is the one of compressed air in the working cylinders for producing the required changes in the direction of motion. It is to be understood that there are many cases where the intervention of a transmission arrangement does not appear to offer any advantage in fuel economy. The limitations imposed upon the designer by the beam and draught of the ship and the weight to be carried may altogether exclude the use of the transmission devices and necessitate the direct application of the power to the work. For example, in high-speed shallow-draught vessels, or in vessels where the speed is high relatively to the dimensions of the ship, the sacrifice in economy by running at a high rate of revolution is not so great as to warrant the introduction of any intermediate gear which would increase the weight of the vessel and therefore the power to drive her. Some suggestions have been made from time to time for applying transmission arrangements to vessels of the type of the *Lusitania* and *Mauretania*, but these are not in the opinion of the present writer by any means favourable cases for transmission arrangements. The advantages of electric transmission over other competing methods may be most concisely stated by pointing out the deficiences of the other two methods as compared with the electrical. In the case of the mechanical transmission by the tooth-gear which has been carried out by the Parsons Marine Steam Turbine Company and by the Westinghouse Company in America the results at sea appear to be quite satisfactory, but we are still left with the necessity of providing a reversing turbine, and while there are means of connecting two separate units to the same shaft, frequent and sudden reversal of motion of the propeller by means of the reversing turbines would probably disturb the satisfactory running condition of the gear, so that while it has been demonstrated to be suited for long distance runs it remains to be proved that it will stand the rough-and-tumble service of a vessel where there is much "backing and filling" to do. The weight, price and economy of the mechanical transmission-gear appears to show no advantage over the electric gear, as the same economy and weight per shaft horse-power can be guaranteed for the electric transmission as is claimed for the mechanical gear transmission. This arises from the fact that the gear ratio can be made higher. The other competitor is the Fottinger hydraulic transmission, an interesting and ingenious proposition. It has one apparent advantage over the mechanical gear, *viz.*, that it is less rigid in its character, but it is not so flexible as the electric transmission, and it also lacks the possibility of convenient application or withdrawal of individual units, although it might be developed in this respect. The efficiency claimed for it is as high as can be attained by electrical means. The costs and weights are not known to the author, but the experience of transmission with high-pressure water is not uniformly encouraging, and for an equal range of adaptation, it appears certain that the electric transmission will be cheaper and more efficient, and the convenience in manœuvring is entirely in favour of the electric gear. To show that the advantages claimed for the electric gear can be realized in practice a vessel has been built and experimental trials and

demonstrations have taken place in the presence of the leading shipowners and shipbuilders on the Clyde. The author believes he is justified in claiming that he has proved that the claims made as to convenience and rapidity of manœuvring and the practibility of the whole arrangement have been fully demonstrated. The actual economy to be gained is a question of study of individual cases. Many of these have been gone into, and although in some it has been found that there is no room for electric transmission, others seem to offer conditions favourable to the use of the electric arrangement, which has always against it the handicap of additional cost and usually of additional weight. It has therefore to win its way against an initial disadvantage which is rather hard to overcome, but the indications are that the ultimate advantages in many instances are such as to warrant the additional expenditure in view of the economy to be gained. Drawings and photographs of the experimental vessel, and also general arrangement of equipments which have been designed and compared with the normal equipments for the same vessels, were shown.

CRUDE OIL MARINE ENGINES.

By Mr. James H. Rosenthal, M.I.N.A., M.I.M.E.

This paper was not intended to touch at all upon the engines used in launches and yachts which work with alcohol, petrol or paraffin, and in which such fluids are vaporised and exploded by an electric spark, but was intended to be confined entirely to engines which may be suitable for larger craft, to work entirely with crude oil of a high flash-point, *i.e.*, not explosible. As the author believes that such engines are only possible generally in the larger powers if they are reversible, the paper was confined to two types representative of this description, *viz.*: (1) Those in which the engines are single-acting and the oil is ignited by means of a heated chamber or hot pot; and (2) those in which the Diesel cycle of combustion is used, and the burning or combustion of the fuel is effected by air compressed in the cylinder to a temperature at which the spray of crude oil will ignite and burn. The question of the supply of crude oil was also touched upon. The class of engine under (1) which, as far as the writer is aware, is the most largely used for the propulsion of small vessels is that introduced by Messrs. J. & C. G. Bolinders, of Stockholm, under Rundloff's patents, and is made in sizes of from 8 h.p. to 350 h.p. The class of engine under (2) is made by the Maschinenfabrik Augsburg Nuernberg, for which in Great Britain Messrs. Harland & Wolff, Ltd., Belfast; the Fairfield Shipbuilding and Engineering Co., Ltd., of Govan, Glasgow; Messrs. Yarrow & Co., Ltd., Glasgow; Messrs. John Samuel White & Co., Ltd., of East Cowes, Isle of Wight; Sir W. G. Armstrong, Whitworth, & Co., Ltd., of Newcastle-on-Tyne; Messrs. Cammell, Laird & Co., Ltd., of Birkenhead, and Messrs. Babcock & Wilcox, Ltd., of London and Renfrew, are licensees. This engine is made single-acting and double-acting and on the two-cycle principle. The Bolinders engine is also of the two-cycle type and is single acting. Two-cycle means that it receives a charge every time the piston reaches the top of its stroke. The same applies to the single-acting Nuernberg two-cycle engine. In the double-acting two-cycle Nuernberg engine a charge of oil is injected each time the piston reaches both the top and the bottom of its stroke. Both types of engines were described, and the methods adopted for reversing likewise, and the written matter was explained by illustrations and lantern pictures.

ELECTRICAL STEERING.

By Mr. B. P. Haigh, B.Sc., Assoc. M. Inst. C.E.

Electrical steering offers considerable advantages for steamers as well as for vessels propelled by internal-combustion engines, for the improved economy corresponds to a saving of weight in boilers and fuel. Difficulty has been experienced in obtaining a reliable system of control, capable of dealing with the power necessary to put the helm hard over in emergency in the shortest possible time, and possessing sufficient sensitiveness to enable an accurate course to be kept by moving the rudder promptly in small angles. Sensitiveness is shown by absence of "time lag" between the movement of the hand-wheel and the corresponding movement of the rudder, and in this respect electrical gears promise an improvement on steam gears, whose economy is reduced when large control valves are fitted. Sensitiveness also requires an absence of undue "idle travel" of the hand-wheel, but a certain small amount is nevertheless desirable. The steering motor may be started and stopped for every motion of the rudder, but it is preferably kept running continuously, mechanical control being introduced either in the form of hydraulic transmission or in the form of magnetic clutches as developed by the writer of this paper. In the latter type of gear two magnetic clutches are employed, these being fitted at opposite ends of the motor; and, as no gearing is kept continuously in motion, the wear and tear, as well as the current required, are reduced to a minimum. The clutches prevent the shock of the sea being transmitted to the electrical system, and as they have considerable flywheel effect, the current taken by the motor does not fluctuate widely under normal conditions, and the steering gear may therefore be supplied from the ship's lighting generator. To economise power it is advantageous to arrange the gear so that greater leverage is obtained when the rudder is hard over than when amidships, and by doubling the leverage in this manner a saving of 30 per cent. may be made in the motor power. Drawings were shown of a steering gear suitable for an 11½-inch rudder-post, and of a smaller gear of the same type, built by Messrs. Brown Brothers & Co., Ltd., of Rosebank, Edinburgh, suitable for a 7-inch post. When tested against an artificial hydraulic load the latter gear developed a torque of 50 foot-tons at the rudder-post and showed an efficiency of over 50 per cent. at half load. It was found capable of moving the tiller through 70° in 25 seconds and responded to motions of the hand-wheel equivalent to 1° of helm.

SUCTION-GAS ENGINES AND PRODUCERS.

By Mr. W. A. Tookey.

Notwithstanding that during the last ten years or so, a very large number of suction gas plants have been installed in all quarters of the globe, with satisfaction to purchasers, as is evidenced by the increasing

demand for these simple and economical apparata, it is a fact that figures recording the actual performances with regard to fuel consumption, cost of maintenance, cost of repair, etc., are difficult to obtain. Yet, in order properly to appreciate the claims advanced by the makers of gas engines and gas producers, it is very necessary that such records should be available, so that comparisons may be made with competing types of motive-power generators, and more particularly those which, according to test figures, would appear to compete very keenly, if not, indeed, to surpass, gas power-plants in reliable and economical working. The author has collected from his own tests, and those available from various sources, representative performances of suction-gas plants of various sizes when under test, not only when the power can be determined by means of some form of brake dynamometer, but when generating electric current—so taking into account the efficiency of the combined gas-electric set—and also, when raising water under different "heads," indicating the comparison between fuel consumed, and foot-pounds of work performed in such circumstances. However, inasmuch as "test" figures are usually obtained, under what must be admitted to be abnormal conditions—no account being taken of standby losses, wastage of coal in charging, in removal of ashes, etc., the engine and producer being worked at a constant and regular output, for but a limited number of hours—further figures were presented, which enable the average performances of suction gas plants of moderate power to be noted. These figures have been compiled from the statements of factory owners in Great Britain and in European countries. They take into account the variations of consumption due to the different grades of fuel used; they reflect the influence of variations of output, of load fluctuation, of length of standby periods, as well as the effect of the variation in the human element in maintaining, or otherwise, those conditions which make for the best gas-making and lowest consumption of fuel per unit of power delivered. Mention was made of the recorded performances of suction-gas engines and plants with regard to non-stop runs, as in information of this character it is possible to realize how reliable are these installations, and what little attention is really needed, provided always that the engine is properly correlated to the producer, and the latter to the quality of the fuel and rate of combustion. Figures representing the consumption of lubricating oil were also given, as being of special interest in view of the criticisms that have sometimes been made in this respect. The experiences of users with regard to the cost of maintenance and repairs, were also referred to. The question of capital outlay was next considered, for engines and producers fixed complete upon foundations, with piping and all accessories. No figures were quoted for buildings or space occupied, as, after all, these items, though of importance, vary so much in value that no useful purpose would be served by any assumption. Having thus dealt with the more important considerations that come under survey in the application of gas power, some attention was given to the comparative costs of operation of liquid-fuel engines of the Diesel type, which, although more efficient as regards utilisation of heat units, available in the fuel for conversion to power, yet require several conditions to be fulfilled before the higher economy becomes apparent in the pocket of the manufacturer. Similarly, some points were suggested with regard to the relative performances of steam engines of the high pressure, superheated, compound, condensing, semi-stationary type, to direct attention to the fact that, although according to test results, it would appear that suction-gas plants are threatened by a competitor, which offers equal economy of operation, there are claims of a negative kind, which must incline the balance of advantages in the favour of the gas-power plant, at all events for moderate powers.

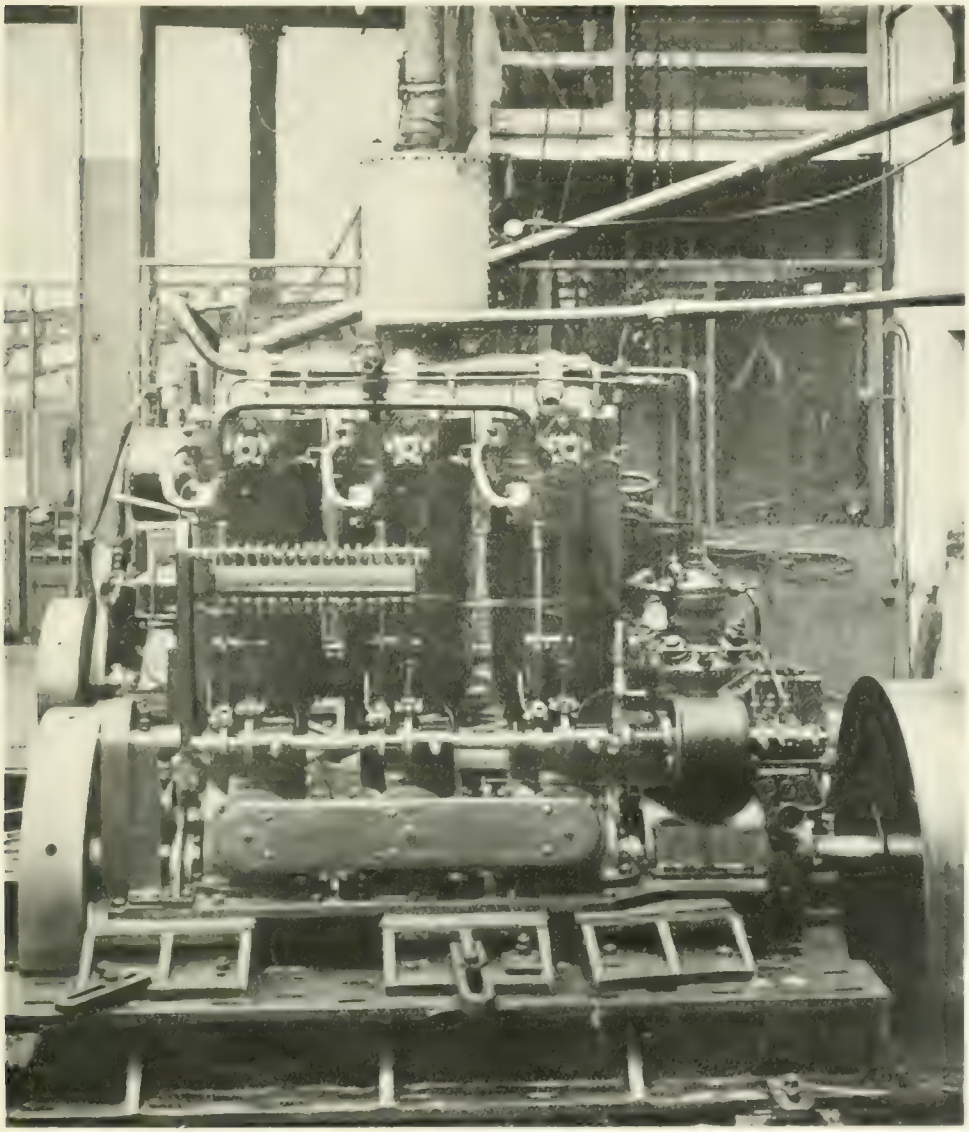
GAS-COAL AND OIL-ENGINED VESSELS.

THE international motor-boat race has been run, the Americans have again scored a victory and retained the trophy. *Dixie IV.* was first at the goal, being followed by two other boats before the *Pioneer*, the Duke of Westminster's hydroplane, arrived. The note of warning sounded at the meeting of the British Association by Sir Wm. Ramsay, as to the coalfields of Britain becoming exhausted in less than two centuries if the present rate of consumption is continued, may have the effect of furthering the adoption of the gas engine, as well as giving an impetus to the thoughtful and inventive engineer to redouble his efforts to economize steam and fuel. There are still some districts abroad where fuel wood can be obtained almost for the gathering, even in the neighbourhood of oil districts, and steam can be used in small vessels with greater economy than gas, but these are isolated cases, as oil motors show a clear gain in fuel economy over steam. With regard to comments recently made on the subject, the South African port of Cape Town is about to have a store house for oil fuel erected under the auspices of the port authority. A very fine motor launch about 45 ft. long was recently despatched to Russia for the Czar by Messrs. White, of Cowes. The engines are the Wolseley type, six sylinders 6·5 in. by 7 in., the speed being fully 900 revolutions per minute. The aerial express service inaugurated by the postal authority from London to Windsor is another token of the advance of motor power. We have before us one of the missives bearing testimony to the success of the venture. The side propellers fitted by the Ailsa Crag Motor Co. are highly interesting, as they can be fitted to an existing yacht or other vessel without the necessity of stern tubes and central shaft. The engine may be placed on deck and the motion transmitted by means of pinions and universal joint to the propeller shaft or shafts led down into the water to give the immersion to the propeller. A new oil tank vessel capable of carrying 14,000 tons has been placed with Messrs. Krupp for construction, to be fitted with Diesel engines. Auxiliary power is being fitted in a three-masted schooner for the fish trade by the Diesel Engine Co. The engine is of four cylinders type capable of exerting about 200 h.p. Reference was made a few months ago to the development of canal traffic and a company has now been formed for the purpose of carrying this forward. Our readers are referred to another column in this number where the matter is dealt with and illustrated.

The Dutch oil-engined trader *Cornelia* has been doing good work; visiting the port of Aberdeen recently with a cargo of cement, she excited a good deal of interest on account of the motive power. The vessels now in hand at Glasgow, Ardrossan and Middlesbrough, in which oil engines are to be fitted, will no doubt help in their results to bring forward more of the same for British owners. The Ardrossan vessel is to be fitted with Bolinders engines of 500 h.p.

At the British Association meetings the subject of oil gas marine engines occupied attention on the introduction of papers by Messrs. J. H. Rosenthal and C. Day, when the views advanced were favourable to the use of this class of engine for cargo or ordinary coasting vessels, but probably not for large passenger or war ships. Vessels of moderate size are now held in view for Admiralty requirements with gas engines, and as the many small boats and launches supplied for the service have proved satisfactory, the step to the larger craft for coastal and other purposes naturally follows.

The *Holzapfel I.*, *Toiler* and *Vulcanus* are each doing service which may be qualified as good as far as can be gathered. The coming new coaster to be fitted with the Bolinders type of engine, to run from the Clyde to the Mersey, Liffey and Bristol Channel will be an additional interest to those already in the waters; with regard to the *Vulcanus* on a voyage from Hamburg to the Black Sea and back, the engines behaved well and proved reliable. The cylinders were kept closed for forty-four days, thus showing that difficulties in connection with accumulation were not great. The new vessel for the same owners under construction in Holland is to be fitted with engines of six cylinders, each 24 in. diameter by 36 in. stroke, using Tarakan crude oil, with very satisfactory results as to steady running and economy, the consumption working out to ·42 pint per B.H.P. The Beardmore oil engine is directly reversible by means of a single wheel connected to a cam shaft which controls the fuel valves and compressed air inlets to give an impulse in either desired direction. The successful running of small coasting vessels has given an impetus to the thoughts of owners of sailing barges and other craft, and Messrs. Buller (Bristol) are laying down vessels for local trading purposes to be fitted with oil engines, while other firms have the subject under consideration in the competition for trade.



Beardmore type of Reversible Crude Oil Engine, with 3 cylinders, developing on trial tests [illegible] B.H.P.

HAULBOWLINE DOCK EXTENSION.—The enlarged naval dockyard at Haulbowline was formally opened on August 31st, when the cruiser *Achilles* was docked.

THE RIGHT TO WORK.—It is interesting to note that the question of the "right to work" was referred to at the recent Trades Union Congress. Probably it was realized by many of those who were present, as representing a larger number who were absent, that intimidation during the vapouring of July and August had been carried to the verge of madness and that those who claimed the right to work should have had their claim allowed without let or hindrance. The use of brickbats is the abuse of argument and betokens an evil cause. It is matter for congratulation that the "right to work" is conceded, and no doubt the thoughtful and responsible members of the community will endorse the view that tyrannical coercion is bad and hurtful to the best interests of the general welfare. The condition of industry or the want of it, in its legitimate sense, a few weeks ago showed the workers many things new and old, and has given them problems to ponder over at their leisure in connection with [illegible] during the coming winter.

crank shaft 3 in. diameter, the engine being of the direct reversible Diesel type. The auxiliary power is to be derived from steam for cargo and deck work, from which it may be inferred that air compression for this purpose has not found favour. For oil cargo vessels, electric power has disadvantages on account of danger due to defective wires or fittings causing flashing in the neighbourhood of inflammable vapour. The reversible crude oil engine of 150 B.H.P. for the Marquis of Graham's yacht has been undergoing trials at the works of Messrs. Beardmore, and a set of 95 B.H.P., also for a yacht has been under a nine-day non-stop test at the same works.

H.M.S. "ACHERON."—The torpedo-boat destroyer of this name was recently launched by Messrs. John I. Thornycroft and Co., Ltd., from their Woolston Works, Southampton. She has been built to the design of Messrs. Thornycroft and is of the special type included in the 1910-1911 programme. The dimensions are—length 2[illegible] ft. 9 in., between perpendiculars, breadth 26 ft. 4 in. The propelling machinery consists of a twin set of Parsons turbines, steam being supplied by three large water-tube boilers fired by oil fuel. The vessel is the first destroyer to be fitted with a two-shaft arrangement of turbine machinery.

REVIEWS.

Shipyard Practice as applied to Warship Construction. By N. J. McDermaid. London: Messrs. Longmans, Green and Co. [illegible] nett.

The author says the volume embraces a course of lectures delivered to students, and we find, as we may expect, an entrance at once into the details of the subject. There is no preliminary whatever. A good feature is that the sketches are alongside the literary matter they illustrate, and it is possible therefore to follow the text readily. The building slip with its attendant keel blocks leads up to the preparation of the frames, and the beginnings of the vessel in the keel and double bottom. From thence we are led on to longitudinal framing and plating, the bending of beams to the shape required, the testing of the correctness of the operations as they go on, and as the vessel advances in construction we come in the warship to the question of armour and arrangements for barbettes and magazines. Shaft brackets and their constructive details are fully gone into with those of their near neighbour the rudder. Engine and boiler seatings are next discussed, and the matter of funnel hatches. By this time launching arrangements are fully described, with the preparations made for completion of the body of the ship, such as testing by water to ensure tightness of the plating and riveting. Light and ventilation require considerable attention, especially the latter, because of the numerous sub-divisions there are in warship design. It may not be generally known, too, that the magazines have to be cooled, necessitating a CO_2 installation. The pumping, flooding and draining arrangements of a man-of-war are very elaborate, all eventualities having to be provided for when the ship goes into action. These are all closely noticed and diagrams shown. The system of taking in oil fuel is seen, with the necessary means of ventilation. A section is devoted also to valves connected with the hull, and these with their fittings are numerous. All the details of water services, fresh and salt water supplies, are found here, and such items as the messing arrangements for crew and officers' cabins. No point seems too unimportant to receive the author's attention. We expect to see torpedo net defence in a work of this character, but we also find boat davits and accommodation ladders. Coaling ship is another matter closely followed out, and in a warship this is important. We have to pass over many particulars of interest, but steering gear calls for some notice. We do not get maker's designs but general principles underlying all systems, with closely reasoned mathematical formulæ for the screw gear and some special makes. It is impossible for us to follow the author further, but we may say that the drawing office and laying off procedure in the mould loft are very complete. How the moulds are constructed is fully shown. Launching of ships, inclining experiments, docking and boat building finish what is probably the most thorough epitome of the details of the subject it is possible to have. The sketches are apparently drawn specially and are of the most minute character. As a whole the labour involved must have been very great, though lightened probably as the outcome of lectures delivered at the Royal Dockyards. Considerable credit is reflected upon the author for the way in which he has combined these lectures into what is likely to prove a standard volume of reference.

Hints on the Legal Duties of Shipmasters. 3rd edition. By B. W. Ginsburg, M.A., LL.D. London: Messrs. Griffin and Co.'s Nautical Series. 5s. nett.

The author is to be congratulated on the demand for a new edition of his book, the skeleton of which was outlined about fifteen years ago at one of the meetings of the Shipmasters' Society, which we can recall with pleasure. Since the first edition was published, so many changes have taken place and conditions have so altered that the work has been entirely revised and brought up-to-date. Starting at the foundation, the early years of training are defined and inferentially and sympathetically, shipmasters are exhorted to the duty and privilege of teaching the rising generation—the apprentices and cadets, to whom the nation will look in days to come to take command and acquit themselves worthily, and for this they must be equipped not only to pass the standard but to aim at higher things. Board of Trade and naval court enquiries are described and their areas of jurisdiction stated. The duty which the shipmaster owes to the shipowner is next laid down, and certain cases are cited to show the law bearing on critical points of action. The master's duty to the crew is set forth in connection with engagements, agreements and articles, whether at the home or a foreign port, with a citation from the Merchant Shipping Act; apprenticeship indentures and how to deal with them. Under the heading of discipline many valuable hints are given including one which may be emphasized, although nowadays it is seldom that the wisdom underlying it is not recognised. "The less the master interferes with the work of the chief engineer's department the better." The offences against discipline are defined, with the penalty attaching to each at the home port or abroad. The provisioning of the ship with the rules regulating the supplies, surveying of food stuffs and medicines forms a chapter extended to treat of accommodation, unseaworthiness and imposition. The law as to advance and allotment notes, money orders, right of wages, death, shipwreck, illness, left behind, proper return port, sale of ship, volunteering to the Royal Navy, payment, lien of wages, suits for wages, are all interesting details which tend to show how closely the seafarer is followed in all his courses, devious or otherwise. Advice on the treatment of passengers next claims the attention of the reader, with the regulations as to the various necessities which arise under the Board of Trade Passenger Act. The financial liabilities of the shipmaster are stated in a few concise paragraphs and the duties expected and demanded of him in respect to cargo of various kinds, inclusive of dangerous goods. Freight, lien for charges, bills of lading, receipts, conditions, deviations, barratry, jettison, are subjects of value to those who are interested directly in ships, and light is given in the pages of this book. Safety on the sea, collision, defence, blame, the law on collisions, report of accidents, salvage, right of award, wrecks, underwriters, steerage passengers, quarantine, customs, coasting voyages, dutiable goods, clearances, have each paragraphs devoted to them, while the closing chapters are devoted to pilotage, dues, offences under pilotage, pilot flags and signals, use of flags, distress and ordinary signals, safe ports, reporting arrival, discharge, official log, protests, etc. A very useful series of appendices is given where much useful information may be obtained in respect to certificates, agreements, regulations of the Board of Trade, underwriters, life-saving, load line, carriage of cattle, etc.

OBITUARY.

Captain A. Graham.

It is with great regret we announce the death of Captain A. Graham, of Hull. The deceased had served for many years as master in several steamers belonging to the firm of Messrs. Wm. Brown, Atkinson & Co., Ltd., and of late years acted as marine surveyor. He was warden of the Trinity House, and for several years chairman of the British Shipmasters Association. During his lifetime Capt. Graham had rendered valuable service to the Humber Conservancy Board, and at the time of his death was vice-chairman of the Marine Committee. Deceased had also been interested in the work of the Newland Homes (for sailors' orphans) and the *Southampton* training ship. The funeral took place from Capt. Graham's residence, the body being interred at the Hull General Cemetery.

Australasian Institute of Marine Engineers, Wellington Branch.—At the annual general meeting of the Institute, held on the 24th July last, Mr. A. R. Hislop, secretary of the Institute since 1892, tendered his resignation, desiring, he explained, to devote more time to his own business. The Institute unanimously passed a resolution regretting the resignation of Mr. Hislop, after twenty years of splendid service for the Institute. The resolution told of the great work done by Mr. Hislop for the engineers of Australia, for which he had received honours and praise from abroad. His Act of Parliament, passed in 1897 by practically his individual efforts after three years of strenuous work, stands out prominently amongst the many great reforms placed to his credit. Mr. Hislop will retain his life honorary associateship of the Institute.

Industrial and Trade Notes.

THE CLYDE AND SCOTLAND.

(From our Own Correspondent.)

Work Accomplished and in Prospect.—Three-fourths of the year have now sped, and in the matter of shipping output the Clyde has shown more than the average activity. Greater briskness in launching tonnage would have obtained but for the fact that in many of the yards a dearth in the supply of workmen has been experienced. Full squads of riveters and a good number of boilermakers have been brought from the Midlands of England and have been apportioned to the yards of Messrs. Scott & Co., Caird & Co., and the Greenock and Grangemouth Dockyard Co.

A section of the ironworkers (the holders-on) have, within the last few weeks, been agitating for a larger share of the moneys earned by the riveting squads. For every shilling allowed to each riveter the share of the holder-on has been ninepence, but the latter have insisted on getting [illegible] and at the moment of writing are on strike over the demand. This not only applies to most of the Clyde yards, but to the yards in Leith and Dundee. Indignation has been widely expressed by the strikers at their being called "labourers" by the riveters, their contention being that they are really skilled workers. Riveters on their part have been demonstrating that by enlisting a third member of their own calling to do the holding-on, work can proceed at least as quickly. Bookings of fresh work have been neither plentiful nor of any great importance, but further reference is made later to all the orders recently placed. Clyde builders on the Admiralty list are at present tendering for sets of engines for two cruisers which are being built in Government yards. Expectation is rife also among private naval builders as to the call for tenders for the three battleships and five second-class cruisers which are to go to the private builders this year. Specifications are now shortly expected.

Additions to Anchor and Allan Lines.—The new Anchor liner, *Cameronia*, which, like many of her predecessors, is from the stocks of Messrs. D. & W. Henderson & Co., Partick, having undergone successful trials, sailed from the Clyde on her first voyage to New York on September 12th. A view of the vessel is given elsewhere in this issue. The directors of the Allan Line, early in September, issued to a number of shipbuilders invitations to tender for the two large steamers which they are to build for their Liverpool-St. Lawrence service. The vessels are to be somewhat larger than the turbine steamers *Victorian* and *Virginian*, which are 520 ft. in length. They are not to be fast mail steamers, but will have a speed of 18 knots. They will be twin-screws, and propelled by reciprocating engines.

Messrs. A. & J. Inglis, Pointhouse Shipyard, who on Sept. 5th launched a paddle steamer of some note in the Steel Press, 205 ft. in length and 60 ft. in width, for tram ferry service in South America, have received an order from Messrs. G. & J. Burns, Glasgow, for two steamers for their service between Scotland and Ireland.

The Fairfield Shipbuilding and Engineering Co., Govan, have been commissioned to build and engine for Messrs. G. & J. Burns, Glasgow, a twin-screw steamer of high speed intended for the services of Messrs. Burns between Scotland and Ireland. The new vessel is to be about 300 ft. in length, will have commodious cabin accommodation, and is designed to carry a large number of cattle and a quantity of cargo. The steamer will be in every way in excess of any vessel hitherto employed in the night services between Scotland and Ireland. On the stocks at Fairfield at the present time are two pairs of high-speed steamers—one pair for the Canadian Pacific Railway Co., and the other for the London and South-Western Railway Co.—in the designs of whose hulls and machinery several new departures are being made. The Canadian Pacific vessels will be propelled by Parsons turbines, not only of high and low, but of intermediate expansion, applied to four shafts—and they will have cruiser sterns (never before adopted in merchant vessels of this size) and a rudder in the form of a large spade, supported on only one pintle.

Messrs. D. & W. Henderson & Co., Partick, about the end of August launched a steamer of about [illegible] tons, built to the order of the Alexander Steamship Co., Adelaide, for their passenger coasting trade. A detailed description, with the vessel in view, [illegible] triple-expansion engines will be supplied from two boilers of the [illegible] type by Messrs. Babcock & Wilcox, Ltd.

Notable New Dredger for Panama Canal.—Messrs. William Simons & Co., Renfrew, on Sept. 16th launched an extremely powerful bucket hopper dredger, [illegible] built to the order of the United States Government for cutting and heavy under-water cutting, and [illegible] at the Panama Canal. An illustration of this notable vessel is given elsewhere in this issue.

Clyde Dredging and Ferry Plant.—Messrs. Lobnitz and Co., Renfrew, have now fairly entered upon the construction of the large bucket dredger for the Clyde Navigation Trustees, and of two of the four hopper barges [illegible]. The contract price for the dredger [illegible] and the four barges, which in each of [illegible] are to cost altogether £[illegible]. The dredger is to be ready for service in April next year, and the barges at intervals [illegible] February, March and April. The Clyde Trustees will consider at an early date the question of replacing a local or large elevating ferry. At the present time [illegible] vessels, two on service and one in reserve.

Messrs. Wm. Denny & Bros., Dumbarton, have secured the contract from the Compañia Trasatlantica of Cadiz for two triple-screw steamers of about 400 ft. long, in which one turbine set and two sets of reciprocating engines will form the propelling power. The vessels are to develop a speed of about 18 knots.

Messrs. Wm. Hamilton & Co., Port Glasgow, have received an order from the Droogdok Maatschappij Soerabaja, Amsterdam, for a floating dock 300 ft. in length, intended for Soerabaja, Java. The dock will be built and delivered complete and towed to Java. At present Messrs. Hamilton are one of the busiest firms on the Clyde, having on hand orders for nine vessels, ranging in size from 400 to 500 ft. in length.

Messrs. Murdoch & Murray, shipbuilders, Port Glasgow, received about the end of August an order from foreign owners for a cargo and passenger steamer for trading on the river Amazon, similar in general design to one they launched for the same service on Sept. 7th. They have also received orders for several barges for shipment for foreign owners.

The Greenock and Grangemouth Dockyard Co., Greenock, received about the middle of August orders for three cargo vessels of between [illegible] and 7[illegible] tons. The orders are understood to have been placed by Glasgow firms, and the vessels will be supplied with their machinery by Greenock marine engineering firms.

New Shipbuilding Firm. Under the title of "Dunlop, Bremner & Co., Ltd." a new company has acquired the shipbuilding, engineering, boilermaking and repairing business at Port Glasgow, which was established by Messrs. Cunliffe & Dunlop in 187[illegible] and since then carried on by the late Mr. D. J. Dunlop & Co. Mr. Donald Bremner, who was associated with the Clyde Shipbuilding and Engineering Co., Port Glasgow, for nine years and many years with the Clydebank Shipbuilding and Engineering Works, is managing director. The engineering director is Mr. Thomas Paton, lately engineering manager to Messrs. D. & W. Henderson and Co., and formerly with the Clyde Shipbuilding and Engineering Co., Port Glasgow, Messrs. [illegible], Govan, and Messrs. D. Rowan & Co., Glasgow. The shipbuilding director is Mr. George G. Barker, lately with the Clyde Shipbuilding and Engineering Co., Port Glasgow, and formerly with Messrs. Raylton, Dixon & Co., Middlesbrough, and Messrs. Harland & Wolff, Belfast. The works are self-contained, with a fitting-out basin within the premises. Both in equipment and *personnel* the works will be brought thoroughly up-to-date, and much consists of dealing with steamers up to 400 ft. [illegible].

Messrs. Ramage & Ferguson, Leith, have received a contract from the Union Steamship Co. of New Zealand for two small steamers.

Aberdeen Floating Dock.—The new floating dock which was built at Barrow-in-Furness for the Port of Aberdeen at a cost of £[illegible] arrived at that port in the [illegible].

Dundee Fitting-out Facilities.—The Caledon Shipbuilding and Engineering Co., Dundee, have [illegible] expenditure in new [illegible] to relieve the Dundee Harbour Trust to increase the facilities at the harbour for the fitting-out [illegible]

out of vessels [illegible] size. In a letter to the Trust lately, the Company [illegible] that the week previous they had received an invitation to tender for the construction of a steamer [illegible] in breadth but owing to narrow dock entrance [illegible] to the lack of a suitable crane to put machinery [illegible] on board they had to allow the opportunity to pass. They asked what prospects the Trustees could [illegible] out of providing the necessary modern crane facilities. In the course of discussion it was stated that it was a regrettable position that the shipbuilders of Dundee were not able to quote for the modern class of vessel. There was no use in Dundee having docks if they were not capable of accommodating modern vessels. The letter was remitted to a committee.

Oil-engined Coaster. The Ardrossan Dry Dock and Shipbuilding Co. are building for a Glasgow firm a coasting vessel of 142 ft. in length, 25 ft. in breadth and 10 ft. in draught. She will be propelled by a four cylinder, Bolinders, direct, reversible crude-oil engine of approximately 500 i.h.p., sufficient power, it is estimated, to give the vessel a sea-speed of fully 8½ knots. She will be the first full-powered oil-engined coaster for British waters, and will be classed 100 A1 at Lloyd's.

THE TEES AND HARTLEPOOLS.

(*From our Own Correspondent.*)

Whitby.

Messrs. Rowland & Marwood have recently added to their fleet the fine screw steamer *Erlesbrough*, and Messrs. Milburn and Lund have recently had launched the s.s. *Glenbridge*; a sister ship will be launched next month.

Middlesbrough.

Messrs. Sir Raylton Dixon & Co., Cleveland Dockyard, continue to be very busy, having recently secured an order for a cargo steamer for early delivery. Enquiries are still plentiful for better-class work, as prices are rising even in the face of keen competition.

Messrs. W. Harkess & Co., Ltd., are reported to be likely to secure the order for a small steamer for Liverpool owners; they continue to be busy on both new and old work.

Messrs. Richardsons, Westgarth & Co., Ltd., are very busy; besides a very fair amount of marine work on hand, they have in course of construction a large gas engine about 60 ft. long, building to the order of the Cargo Fleet Steel Co. They also have a considerable amount of specialty work on hand, Nesdrum boilers, contraflo, condensers, etc.

Messrs. Smith's Dry Dock Co., Southbank, continue to be very busy; they have the s.s. *Carnarvonshire* converting her into a whaling vessel for Norwegian owners. Also Messrs. Wilson's, of Hull, s.s. *Bassano* undergoing repairs to bottom and general overhaul. The s.s. *Garonne*, of Christiania, is undergoing extensive overhaul and repairs.

Messrs. Gladstone & Co. have recently sold their s.s. *Cynus*, 3368 gross tons, to German owners through the Shipping Agency, and Messrs. J. M. Leonard & Sons, Ltd., have sold the s.s. *Italia*, 410 gross tons, to British buyers.

Stockton and Thornaby.

Messrs. Richardson, Duck & Co. are expected to secure an order for a cargo steamer that is in the market; they, however, continue to be fairly well off for work.

Messrs. R. Ropner & Sons. Although fairly busy, nothing new is reported during the month. They have a fair amount of work on hand, but there is still room for improvement.

Messrs. Craig, Taylor & Co. continue to be fairly busy. They are reported as having booked an order for a cargo steamer which, with the work on hand, will carry them into next year.

Messrs. Blair & Co., Ltd., continue to be very busy. They have recently booked one or two orders for machinery for boats to be built on the Tees and Wear. Competition, however, is very keen amongst engineers, there being a very little margin of profit, too small to allow for a single bad contract.

West Hartlepool.

Messrs. W. Gray & Co. continue to be very busy and to book orders, except for the smaller class of vessel such as coasters. They recently had another fire at their old yard, which will cost them altogether about £1000, as a vessel nearly finished will require about half a dozen new plates, perhaps a frame or two.

Messrs. Irvine's Shipbuilding and Dry Dock Co., Harbour Yard, continue very busy; as recently reported they were likely to secure the order for another steamer for the Tyne and Tees Steamship Co. The contract now placed is about the same size as the *Teesside*, but of less power, but the proportions of the ship are expected to enable her to do the same speed.

Messrs. W. Gray & Co.'s Central Marine Engine Works continue as busy as ever; they have a good reputation for drop forgings and to cope with the work have had to put down two additional hammers. Alterations have also had to be made to their foundry specially set apart for ship and general castings, in addition to their foundry for marine work. This firm is well booked ahead for at least twelve months.

Hartlepool.

Messrs. Irvine's Shipbuilding and Dry Dock Co., Middleton Yard, continue very busy. They have just booked a repeat order of the large twin-screw meat boat for a Liverpool syndicate building to Messrs. Esplen & Son's specification, and which is reported as being the largest vessel built at this yard. In the repair and dry dock department they are reported to be booked up to about Easter.

Messrs. Richardsons, Westgarth & Co., Ltd., are busy in all departments. They have secured the contracts to supply the engines and boilers to be fitted to the boats building at both yards of the Irvine Shipbuilding and Dry Dock Co., and they also have a fair amount of work on hand for their specialities, condensing plants, etc.

THE HUMBER AND DISTRICT.

(*From our Own Correspondent.*)

THE Humber training ship, *Southampton*, moored in the Humber, with over 175 boys on board, was run into at midnight by the Wilson liner *Juno*; fortunately all damage was above the water line. She drifted from the river. The tug *Presto*, belonging to the Wilson line, towed her into Alexandra Dock; the young tars behaved very well under the ordeal.

Goole New Bridge.—The Aire and Calder Navigation's extensive scheme of improvements and extensions at Goole, work on which has been proceeding for over eighteen months, was opened on the 17th ult. The new bridge is a fine piece of engineering work. It is a swing bridge with a 50-ft. span, and over 40 ft. wide to carry the street traffic over the Aire and Calder Canal; it will be operated by hydraulic power, and the time of moving vessels through will be reduced to a minimum.

Goole Shipbuilding and Repairing Co., Ltd., have launched from their Victoria Shipyard a handsomely modelled steel screw fleeter, for Messrs. Kilsall Brothers and Buching, Ltd., of Hull and Manchester.

Messrs. Earle's Shipbuilding and Engineering Co., Ltd., are still very busy with new ships and repairs. The patent slips have been fully employed, the boiler and engine shops are working at high pressure.

Messrs. Hull Central Dry Dock and Engineering Works, Ltd.—This Company always secures a great share of repair and dry-dock work of ships coming to Hull. Besides using their own graving dock, they have had to engage the Hull and Barnsley Railway Co.'s graving dock. The following steamers have been undergoing repair, also graving-dock work:—S.s. *Hillbrook*, s.s. *Star of Australia*, s.s. *Athenic*, s.s. *Jevington*, s.s. *Roona*, s.s. *Antigone*, s.s. *Olof*.

Messrs. C. D. Holmes & Co., Ltd., engineers and boilermakers, are very busy completing triple-expansion engines, boilers, etc., for trawlers and fleeters, and coping with orders for auxiliary engines and compound winches. The branch establishment at Alexandra Dock has had several ships in for opening out machinery for survey, etc.

Messrs. Amos & Smith, engineers and boilermakers, have still to run machinery night and day to complete orders, consisting of engines and boilers and auxiliary machinery for trawlers and fleeters. They are well booked ahead with orders. The branch works at Alexandra Dock are fairly well employed dry-docking several Wilson liners and other companies' steamers.

Messrs. Cooper & Co., Ltd., engineers and boilermakers, Neptune Street Works, have been fairly well employed with outside work, opening out boilers and machinery for survey for Lloyd's and graving-dock work and general repairs. The boiler and moulding shops keep fairly busy and the Company's graving dock, situated on the old harbour, is fully employed with coasting and small steamers.

East Coast Engineering Works, Ltd., have been very busy on the following vessels:—S.s. *Dolcoes* fitted with new donkey boiler and connections and general repairs to deep tank, keelson and deck repairs; s.s. *Queenie*, stern damage and other repairs; s.s. *Manchuria*, s.s. *Invicta*, frames; s.s. *Norlands*, s.s. *Bruito*, s.s. *Gustaf*, s.s. *Fredheim* and s.s. *Grassbridge*, new plates fitted.

Messrs. Woodall & Co., engineers and boilermakers, are keeping fairly busy with general repair work especially among the coasting steamers. The outside staff is also employed at the Corporation tram power station overhauling machinery, etc. The smiths' shop continues very busy; an order has been received from a South Coast shipyard to forge a stern post.

Messrs. Cochrane & Sons, shipbuilders, Selby, are booked well up with orders for new trawlers, etc., and working overtime to cope with the work. They are still booking new contracts but cannot guarantee delivery. Two trawlers for Grimsby owners were launched last week, built to Lloyd's requirements and rules.

SOUTH OF ENGLAND AND ISLE OF WIGHT.

(From our Own Correspondent.)

New South American Service. As intimated in last month's notes a new service to South America will shortly be inaugurated by Messrs. Lamport & Holt, the vessels calling at Southampton on the return from the Plate. The first vessel, the s.s. *Vandyck*, has completed her trials, and been accepted by the owners and will sail from Liverpool on the 5th of this month.

Messrs. Harland & Wolff, Ltd.—The Great Western Railway Co.'s steamer *Rembrandt* is in dry dock at Southampton undergoing extensive repairs by this firm. Practically the whole of the bottom will have to be renewed, and it will be some considerable time before the vessel will be able to take up her station in the Company's service. In addition to the extensive repairs to the *Rembrandt*, Messrs. Harland and Wolff have a big repair job under weigh on the Cie. Générale Transatlantique's steamer *La Touraine*. The vessel has been lying in the new wet dock near the firm's erecting shops, and it is understood that to effect repairs the engines will have to be lifted out of the ship. The vessel has twin screws driven by triple-expansion engines with cylinders 41 in., [illegible] in. and [illegible] in. diameter respectively, with a piston stroke of [illegible] in., from which it will be gathered that there will be some very heavy lifts to remove from the ship. The *La Touraine* is [illegible] ft. long and was built in 189[illegible].

The British and Irish Steam Packet Co.'s steamer s.s. *Lady Connaught* arrived at Southampton on the 19th of last month. She is the latest addition to the Company's fleet.

Messrs. Day, Summers & Co., Ltd., Northam Ironworks, Southampton.—Last month the cargo boat *G. Pierce* [illegible] tons, which was ashore at Guernsey, was hauled up on the slip at the above yard for repairs. The damage to the bottom and the double bottom is very extensive. The firm have just secured an order from Liebig's Extract of Meat Co. for a [illegible] ft. tug boat. The following yachts have come up to the yard and taken up berths for the winter:—S.y.'s *Conqueror*, *Dodo*, *Mariquita*, *Mahenoa* (Mr. Paget, owner) and *Gipsy* (owner, Sir John Jackson).

Messrs. J. Samuel White & Co., Ltd., East Cowes, Isle of Wight.—H.M.S. *Flirt*, torpedo boat destroyer of last year's naval programme, completed her trials satisfactorily about the middle of last month, and is now being got ready for handing over to the Admiralty. During last month various naval steamboats have been despatched both for British and foreign account. The revenue cruiser *To-la-Oliver* has completed satisfactory trials, and will shortly be delivered. She is to the order of the Cuban Government. The boat shops are very busy, and work continues plentiful.

Messrs. Simpson, Strickland & Co., Dartmouth, South Devon.—The above firm have recently launched a [illegible] and are now busily engaged on the work. A small [illegible] steel motor launch has been ordered for South America, and also two very [illegible] boats, [illegible] for the American Line. These are to be delivered early in December. A fast steel tank launch is now in order and will have a triple engine, and an oil-fired water-tube boiler. A steel steam launch for the Admiralty has been launched last month, and will be handed over very shortly. Also a steel steam cutter for the Admiralty for one of H.M. Royal yachts was completed and launched last month. A steel steam launch is now being prepared for the large steamers of the Union Steamship Co. of New Zealand. The alteration to the steel working yacht *Columbia*, are now in an advanced state and the new bow is completed. This vessel is being lengthened and the forward part entirely rebuilt. A large amount of repairs are on hand and laying up of yachts is taking up a good deal of attention.

Messrs. J. I. Thornycroft & Co., Ltd., Woolston Works, Southampton.—British Admiralty Work.—H.M.S. *Velox*.—This vessel has satisfactorily completed her speed trials, etc., and last month the machinery was being opened up for inspection preparatory to handing the vessel over to the Admiralty. H.M.S. *Bird* a sister vessel was successfully launched from the Company's yard on the 26th of last month, and is now fitting out. Armoured Motor Patrol Boats.—Eight of these vessels have completed successful trials, and been shipped to their destination, and others are almost ready to follow. The two twin-screw tugs which the firm are building are well advanced and will shortly be ready for launching. Repair Work.—The Repair Department has been well employed during the past month with work on a number of troopships, yachts, etc.

Southampton Docks. A persistent rumour is in circulation here to the effect that the London & South-Western Railway Company have purchased about 400 acres of the Western shore from Mr. Tankerville Chamberlayne, for the purpose of constructing quays for a length of about four miles along the Western bank of the river Itchen. There would be easy railway access to the proposed quays, as a branch line from Netley to Portsmouth runs past the site. This rumour was in circulation about a year ago, but the land reported bought by the Company then was only about half that now said to have been purchased. The opening of the new wet dock does not seem to have eased the congestion at the various docks to any great extent, and extra accommodation is very badly needed. If the Western side is to be developed we will have a similar condition of affairs here to that obtaining at Liverpool and Birkenhead.

THAMES.

(From our Own Correspondent.)

Settlement of Dock Strike. This dispute, which was beginning to assume very serious proportions, has happily been settled completely, and some considerable credit must be given Mr. John Burns for this settlement. He it is who acted as chairman of the conferences that were held. The lighterage agreement was the outcome of one of these meetings between the coalowners and the lightermen. The increases of pay all round range from 10 per cent., and as much as [illegible] per cent. in some cases, [illegible] that has to be paid in this instance. Another dispute was between the short sea traders and their seamen and firemen. Wages are to be in future for the former £4 [illegible] a month and the latter £5, and weekly for both 32s. 6d. The dockers' dispute was settled at a conference between the shipowners and the National Transport Workers' Federation in which the terms of agreement [illegible]. Perhaps the men as well as the Government had had enough of the matter for the strike had been going on for weeks. For a number of days [illegible] for want of coal the dredging of the river had to be stopped, and when it [illegible] week from the river bottom it will be seen that [illegible] the work must soon lead to [illegible]. The opening of trade, which is practically at [illegible] the

on the river has suffered too. The boilermakers and shipwrights still work on better terms. It will be seen what effect the new [illegible] will have on this industry. The operatives object to piece work in this department. However, as no more has come to light in this connection it is to be presumed the danger is over and that all have now settled down to make up for lost time. It is surprising how few accidents arose as a consequence of the disturbance. Barges held up were without care of any sort and liable to drift about to the detriment of navigation generally. Yet if anything untoward has occurred we have not heard of it. The position generally was summed up by Mr. Cattarns, of the short sea traders, when he said competition will not admit of any further expenses whatever. The limit has therefore been reached if we accept this statement.

New Liner.—The P. & O. Co. have by this time despatched their new vessel the *Malwa* which was due to sail on the 23rd ult. from London.

Thames Shipbuilding.—It will be remembered that the Thames Ironworks Co. had a floating crane specially built for fitting out the *Thunderer*, and this has been successfully brought into use by lifting the two barbette mountings, each weighing 150 tons apiece. The company-built vessel the 27-knot ocean-going destroyer *Nautilus*, has passed her trials and gone into commission.

Motor Fire Launch.—The Fire Brigade has recently had built a new fire float which draws only 4 ft. of water and will therefore be able to approach closer to river side fires than the vessels now in the service. The trials have taken place on the river, the launch being from designs by Messrs. Wells and Kemp, the well-known naval architects.

New Thames Tunnel.—A new tunnel is about to be commenced at Woolwich for pedestrian use only, and to connect North and South Woolwich. The tunnel will be 550 yards long and 11 ft. 6 in. wide, and for part of its course will be 10 ft. below the bed of the river. Spiral staircases will give access to the tunnel at each end, the shafts for the stairways being 70 ft. deep on the north and 60 ft. deep on the south side.

MERSEY AND MANCHESTER SHIP CANAL.

(*From our Own Correspondent.*)

Messrs. Cammell Laird & Co.—After the recent labour unrest the various large contracts in hand by this Company are now being pushed forward. H.M.S. *Lapwing* is in the wet dock receiving her machinery, while her sister ship *Lizard* is expected to be launched about the first week in October. These are fine serviceable sea-going destroyers of the new "Acorn" class, and are expected to have a sea speed of 27 knots. H.M. tenders to depot ship *Adamant* and *Alecto* are also both fitting out in the wet dock, and will shortly be ready for trials. These boats are of special interest, due to their being the pioneers in the class of Admiralty vessels due to the era of the submarine. Their dimensions have already been given in our pages. The main-sweeping submarine signalling and wireless telegraphy apparatus, and the large electric installation for supplying power for the workshop, charging the batteries on submarines, etc., impart additional interest to these craft. Work is proceeding steadily on H.M.S. *Audacious* and *Melbourne*, also on the 30,000-ton floating dock, upon which craft the utmost secrecy is being observed. The new steamer for the L. & N.W. Railway Co. is in frame and is being expedited, while the tug boat for the Port of London Authority is picked and plated. The repair department, whose headquarters are now in the Royal Liver buildings, under the able management of Mr. Roy Laird, has been very busy. The destroyer *Lively* has been in for repairs and is now on service again. The Johnstone liner *Quernmore*, and the sailing ships *Cambusdoon* and *Grande Duchess Olga* have been in dry dock. The Booth Liner *Benedict* is receiving new decks and floors, and the work is expected to take about six weeks. The keel has been laid of a steam wheel steamer similar to the *Francisco Salles*, with dimensions of length 110 ft., beam 22 ft., depth 5 ft. for Amazon service, while an order for sixteen barge frames for Colombo has also been secured. An interim dividend of 2½ per cent. has been declared on the preference shares.

Messrs. Clover, Clayton & Co.—With the improved facilities now enjoyed by this firm at their Birkenhead yard, a large amount of repair work has been dealt with. Of special interest is the repair of the coasting steamer *Race Fisher*, which was in collision with the dock wall at Runcorn. A temporary wooden bulkhead, strengthened with cement, was built in by a staff of repairers, the vessel being then floated into dry dock, where permanent repairs were carried out. The steamers *Argyll*, *Iris* and *Lillebonne* have all been in for collision damage, while the usual overhaul and refitting has kept the docks fully occupied.

Messrs. H. & C. Grayson.—This firm have been well known for their large repair contracts. The most noteworthy work recently secured is the extensive repair work to the hull of the Cunard steamer *Ivernia*, which is being undertaken in the Brocklebank dock. Such rapid progress has been made with this work that at the time of writing the vessel is expected to undock in a few days. The steamers *Duke of Lancaster* and *York* are being reboilered, while the North Wales steamer *St. Tudno* and the I.O.M. *Mona's Isle* are in for collision repairs.

The Mersey Dock and Harbour Board.—Now that the labour troubles are over, work on the new Gladstone Dock is progressing well, and it is hoped that the undertaking will be completed in the estimated time. On August 22nd the Board's North-west Lightship was sunk through being struck by the s.s. *Pacuari*, the crew just having time to take to their boat and were later brought back to Liverpool. The accident happened early in the afternoon, thus enabling a relief lightship to be placed in position before dark.

The Leeds and Liverpool Canal.—A remarkable condition of affairs on this canal has been caused by the continued drought. Traffic has been impeded and in places entirely suspended. All the locks between Skipton and Wigan have been closed for a month, and there has been no traffic to Blackburn from Manchester or Liverpool, which usually consists of about 5000 tons of coal, grain and raw cotton and manufactured goods every week. It is ten years since such a serious stoppage took place, and a week's rain is required to restore the water to its proper level.

The Allan Line.—It is reported that tenders have been asked for recently for two new steamers of about 520 ft. in length and of 18 knots speed to be fitted with reciprocating engines, thus being of the intermediate type. While it is known that the Canadian people are not satisfied with the speed of the fast mail steamers, it is evident that the Allan Line have need of these two steamers, which will probably be used to strengthen the St. Lawrence, also the Newfoundland and Halifax services. When Canada has spoken it is quite certain that this progressive company will be prepared to meet her needs.

The Development of Fishguard.—Only as recently as 1906 was the Fishguard Harbour constructed by the G.W. Railway for their service to Rosslare, 54 miles distant. On August 29th the Wilson liner *Highland Warrior* embarked passengers there on her maiden voyage to South America. Thus in the short space of five years vessels of the Cunard, Booth, Blue Funnel and Wilson liners have come to use the harbour.

Lamport and Holt Line.—The s.s. *Vandyck* arrived in the Mersey after successful trials on Sept. 12th from the builders' hands, Messrs. Workman, Clark & Co.

White Star Line.—The death took place recently of Mr. Henry Isaac Thorpe, late assistant victualling superintendent of the White Star Line. Pursers and stewards from liners in port attended the funeral, while after the service the "Last post" was sounded by the bugler of the *Arabic*. Mr. L. C. Shipley has been appointed to the vacant position. The triple-screw steamer *Laurentic* has recently made a new record by making the round trip between Liverpool and Montreal in thirteen days four hours.

NORTH-WEST OF ENGLAND.

(*From our Own Correspondent.*)

Barrow.—There is no shrinkage to note in the general activity in the shipbuilding industry of Barrow. Indeed, the indications favour the continuance for a long time to come of briskness in all departments. This is as well assured by the work which is in hand as by the certain prospect of good orders to follow. The Vickers' yard has never been as

fully employed as its capacity will permit of. That is of course speaking of the shipbuilding side of the works. On the engineering side business has been very brisk for a considerable period and this state of things is likely to continue as well in the marine shops as in the gun mounting department.

The Cruiser "Dartmouth."—The trial trips of this vessel, built at Barrow by the Vickers' firm, passed off highly satisfactorily, a speed of over 25 knots being attained without the aid of her full power. She is now ready for her acceptance trials and will leave Barrow before the end of September with that object.

H.M.S. "Phœnix."—This torpedo-boat destroyer, built for the British Admiralty, is now ready for launching. This is the first order for this type of craft which has come to Barrow builders for some years past, but as Messrs. Vickers Ltd. build all classes of warships it was felt desirable to keep in touch with this class of vessel, and with that view to get that data about her economy which can only be gained by experience. The chances are that other Powers will require torpedo boat destroyers of modern equipment and any firm which devotes its attention to warship construction must necessarily have all the knowledge which can be obtained. There is reason to believe that the Vickers' Company will in the future be in for more and more of this class of work.

Chinese Cruiser.—The small Chinese cruiser built at Barrow is nearly ready for her trials. She has a very smart appearance and looks as though she would do some full travelling. The Chinese Government have an ambitious programme of warship construction in hand, and it is more than probable that some of the orders for large and small vessels required to bring into life a new navy for China will come to Barrow.

Turkish "Dreadnought."—The Turkish "Dreadnought" ordered from Messrs. Vickers Ltd. is being laid down on the berth from which the British battle-ship cruiser was launched a few months ago. It was thought this berth was left open for a still larger vessel which it is expected will be built at Barrow, but there are several other berths in the yard on which the largest ships of war can be laid down. This Turkish battleship has to be delivered in less than two years.

The Japanese Battleship Cruiser.—The strictest secrecy is being observed as to the details and design of this monster battleship cruiser. Her progress in construction is very noticeable. She is beginning to lift her sides, and to assume shape and form. She will be a prodigious ship of war, and when mounted with the modern guns of great calibre she will make one of the most formidable vessels ever designed for warfare.

H.M.S. "Princess Royal."—Much headway is required to finish this big vessel by March in next year, but a whole army of men are employed on her in various departments, and by degrees the work to be done in her is being depleted in a way which is only possible when everybody is working at high pressure. Some delay to this ship occurred owing to the lockout of boiler makers, but gradually the arrears of work are being overtaken and there is reason to believe very little will need to be done with the ship when her contract time for building expires.

H.M.S. "Lion."—This battleship cruiser, built at Devonport, has been engaged by the Vickers' Company. The trials are to take place almost immediately. Some interest is taken in these because the *Lion* is a sister ship to the *Princess Royal*, and her engines are a duplicate of the latter ship.

Spying.—A number of unauthorized people having on occasions tried to obtain information about the naval warships, submarines and other things in progress under cover at the Vickers' yard, it has been found necessary to guard the docks at Barrow with men from H.M.S. *Hawke*, and an extra staff of policemen has been provided in the several departments of Messrs. Vickers' works, not only for the protection of property, but in order to keep a strict eye on all that is taking place in the yard.

The Steamer "Arizona."—One of the sensations of the month was the seizure of the Middlesbrough steamer *Arizona*, which was undergoing alterations at Messrs. Vickers' works with the view to her being utilized to carry guns and munitions of war to some place unknown. The owners state that the steamer was bound for a South African port, and others alleged she was intended for the Portuguese Loyalists. At any rate she was seized by the Customs and will have to be dismantled.

The Hæmatite Trade.—Great depression still prevails in the hæmatite iron trade, and prices are at 64s. for mixed Bessemer Nos. [illegible] and [illegible] 8d. warrant [illegible].

Shipping.—The shipping trade is very quiet and exports of iron and steel continue to show marked shrinkage [illegible] the course of last year.

NEW FLOATING DOCK FOR ROTTERDAM.

MESSRS. Swan, Hunter & Wigham Richardson, Ltd., have added another important floating dock to the long list of those which they have already built for the British Admiralty, Colonial and Foreign Governments, and various Companies in many parts of the world. On the 8th September, they launched from their Wallsend Shipyard a new floating dock, built to the order of Wilton's Engineering & Slipway Company of Rotterdam, being the second that they have built for this Company. The dock is 365 feet long and 81 feet wide. It is a double-sided self-docking dock of the type known as the "Bolted Sectional," designed by the eminent floating dock engineers, Messrs. Clark & Standfield of Westminster. This type is the latest improvement in floating docks, and combines the advantages of the great longitudinal strength of the "Box" type, with facility for self-docking. The dock is built in three sections, which are bolted together, and are disconnected only when self-docking is required for painting or repairing the under-water parts. Any two sections of the dock can lift the third section to a height sufficient to allow barges and workmen to pass underneath. The pumps are centrifugal, and are driven directly by electric motors. The installation is divided into three parts, each one working one of the sections of the dock independently.

The three sections of the dock were launched separately, about half-an-hour elapsing between each event, and shortly after the whole dock was bolted together in the river. An illustration of the dock appears over page.

INSTITUTE OF MARINE ENGINEERS.—The opening meeting is to be held on Monday, October 2nd, when the subject for discussion is gas engines for marine work, and all interested in the subject are invited to attend. The meetings of the Institute are held on Monday evenings at eight at 58, Romford Road, Stratford. The annual dinner is arranged to take place at the Hotel Cecil on Friday, November 17th, with the president, the Marquis of Graham, C.B., as chairman.

A ANNIVERSARY.—On September 5th, 1811, the *Lord Nelson* auxiliary paddle vessel of 300 tons left Hull bound for a northern port with twenty-five passengers, [illegible] average passengers and eighteen of a crew, including two engineers. Captain Humble, who was in command, had his wife with him. Soon after leaving the Humber became rough, to add to the difficulties, the engines were disabled and after passing St. Abb's Head, the ship struck on Farn Rock. The signal for help [illegible] the keepers of the lighthouse [illegible] Darling, who volunteered to go with her father in their boat, leaving her mother [illegible] by their [illegible] saved the lives of those who would otherwise have shared the fate of the fourteen who were engulfed in the waters. Thus Grace Darling immortalized her name and gave an impetus and an incentive to the wave of enthusiasm, for duty in the face of danger which was carried over the land to the steps of the throne.

LAUNCHES AND TRIAL TRIPS.

LAUNCHES English.

Aidan.—On July 27th there was launched from the yard of the Tyne Iron Shipbuilding Co., Ltd., of Willington Quay on Tyne, a steel screw steamer for Messrs. The Booth Steamship Co., Ltd., of Liverpool, and of the following dimensions, viz.: Length about 300 ft., breadth 50 ft., depth moulded 27 ft. 9 in., and to class 100 A1 at Lloyd's, shelter deck rule with long bridge. This vessel has water ballast fitted right fore and aft on the cellular system and also in deep tank, and is also fitted with all modern improvements for the rapid loading and discharging of cargo including nine double cylindered steam winches, direct-acting steam windlass and steam and hand steering gear with combined telemotor gear by Messrs. Brown Bros. & Co., Ltd., of Edinburgh, and electric light equipment by Siemens Bros. Dynamo Works, Ltd. The vessel is handsomely fitted up amidships with luxurious state-rooms for a large number of first-class passengers under the bridge deck with commodious dining saloon, smoke-room and bar on top of bridge deck. A very elaborate arrangement of refrigerating chambers is to be fitted up on board. The shelter deck aft is also fitted up for a large number of third-class passengers with dining saloon and entrance house and forward end of the shelter deck is fitted up for accommodation of the crew. The engines, which are supplied by Messrs. The Wallsend Slipway and Engineering Co., Ltd., of Wallsend, are of the triple-expansion type, having cylinders 24 in., 40 in. and 67 in. by 48 in. stroke and working at a pressure of 180 lbs.

Steel Screw Steamer.—On July 27th, Messrs. Osbourne, Graham & Co. launched from their yard at Hylton a steel screw steamer which they have constructed to the order of Messrs. Pile & Co. She is a raised quarter decker 229 ft. by 36 ft. by 13 ft. 6 in. depth moulded, and has been classed under special survey at Lloyd's for the Argentine Brazilian coasting service. The vessel is well equipped and has three large hatchways, double derricks, etc. Water ballast is in the fore and after peak and in after tank. Accommodation is fitted up in houses on the bridge for the captain, officers and engineers; crew in forecastle. The vessel is to be fitted with engines having cylinders 15 in., 25 in., 40 in. by 27 in., with one large boiler capable of maintaining a good speed at sea.

Linaria.—On July 27th, Messrs. William Dobson & Co. launched from their shipbuilding yard at Walker a steel screw steamer built to the order of Messrs. Stag Line, Ltd., of North Shields, Messrs. Joseph Robinson & Sons, managers. The vessel has been built to the highest class of the British Corporation, and has the following dimensions:—Length between perpendiculars, 331 ft.; breadth, 48 ft.; depth moulded, 24 ft. 6 in. The specification is a very full one, adapting the vessel to all the modern requirements of the grain and other bulk cargo trades. The machinery, which is being constructed by the North-Eastern Marine Engineering Co., Ltd., of Wallsend, is of the triple-expansion type, with cylinders 22½ in., 36½ in., 62 in. by 42 in. stroke, and there are three large boilers. Messrs. Wailes, Dove & Co.'s "Bitumastic" enamel has been applied to the engine and boiler-room tanks.

Kamouraska.—On July 27th, there was launched on the Tyne the steel screw steamer *Kamouraska*, which has been built to the order of Messrs. E. F. & W. Roberts, of Liverpool. The principal dimensions of the vessel are:—Length, 375 ft.; breadth, 51 ft. 9 in.; and depth moulded, 30 ft. 9 in. The vessel has been built to Lloyd's highest class on the Isherwood system with wide-spaced transverse frames and bulb-angle longitudinals, as a single-deck ship without hold beams, and arranged throughout on the self-trimming principle. The propelling machinery will be of the triple-expansion type with cylinders 26 in., 44 in. and 73 in. by 48 in. stroke, steam being supplied by three boilers working at 180 lbs. pressure under forced draught. The naming ceremony was performed by Miss Edna Roberts, daughter of Mr. Edmund Roberts, senior partner of the owners' firm.

Roselands.—On July 28th, Messrs. William Gray & Co., Ltd., launched the handsome steel screw steamer *Roselands*, which they have built for Messrs. The Wilson Shipping Co., Ltd., West Hartlepool (Messrs. Joseph F. Wilson & Co., managers). She will take the highest class in Lloyd's Register and is of the following dimensions, *viz.*:—Length over all, 387 ft.; breadth, 51 ft. 3 in.; and depth, 28 ft. 6 in., with long bridge, poop and topgallant forecastle. The saloon, state rooms, captain's, officers' and engineers' rooms, etc., will be fitted up in houses on the bridge deck and the crew's berths in the forecastle. The hull is built with deep frames, cellular double bottom and aft-peak ballast tank, eight steam winches, steam-steering gear amidships, hand screw gear aft, patent direct steam windlass, shifting boards throughout, stockless anchors, telescopic masts with fore and aft rig, boats on deck overhead, and all requirements for a first class cargo steamer. Triple-expansion engines are being supplied by The Central Marine Engine Works of the builders, having cylinders 25 in., 41 in. and 68 in. diameter with a piston stroke of 48 in., and two large steel boilers with a working pressure of 180 lbs. per square inch and with a view to obtain higher speed when required, a large auxiliary boiler has been added, also with a working pressure of 180 lbs. per square inch. A C.M.E.W. winch condenser and auxiliaries of the latest type, also steam ash hoist have been fitted. Messrs. Wailes, Dove & Co.'s "Bitumastic" enamel has been applied to the tanks, and their patent "Bitumastic" covering to the tank tops. The trial trip was run on the 16th Sept., and was very satisfactory, an average speed of 11 knots being attained. Later the vessel left for Hull, where she will load for the River Plate.

Robert Coverdale.—On July 28th, Messrs. William Gray and Co., Ltd., launched the handsome steel screw steamer *Robert Coverdale* for Messrs. Coverdale Brothers, West Hartlepool. She will take the highest class in Lloyd's Register and is of the following dimensions, *viz.*:—Length overall, 361 ft. 6 in.; breadth, 50 ft.; and depth, 25 ft. 11 in., with long bridge, poop and topgallant forecastle. The saloon, state rooms, captain's, officers' and engineers' rooms, etc., will be fitted up in houses on the bridge deck and the crew's berths in the forecastle. The hull is built with deep frames, cellular double bottom and large aft-peak ballast tank, seven steam winches, steam-steering gear amidships, hand-screw gear aft, patent direct steam windlass, large horizontal multitubular donkey boiler, shifting boards throughout, stockless anchors, telescopic masts with fore and aft rig, boats on deck overhead and all requirements for a first-class cargo steamer. Triple-expansion engines are being supplied by The Central Marine Engine Works of the builders, having cylinders 25 in., 40½ in. and 67 in. diameter with a piston stroke of 45 in. and two large steel boilers for a working pressure of 180 lbs. per square inch. The trial trip was run on the 15th Sept., and though the weather conditions were not of the best, the results obtained were highly satisfactory, the mean speed being 11 knots.

Lord Ridley and Lord Airedale.—On July 28th, two steam trawlers were launched at Messrs. Smith's Dock Co.'s Middlesbrough shipbuilding yards for the Port of Blyth Steam Fishing and Ice Co., Ltd. One vessel was named the *Lord Ridley*, the other vessel the *Lord Airedale*. It is expected that the nucleus of the fleet of trawlers building for the Blyth Co. will soon be completed, when operations will be commenced at the port of Blyth.

Chalecdony.—On July 29th, there was launched from the yard of Messrs. Cochrane & Sons, Selby, a steel screw trawler, the principal dimensions being 140 ft. by 24 ft. by 12 ft. 7 in. by 13 ft. 6in., moulded. The vessel has been built to the order of Messrs. The Kingston Steam Trawling Co., Ltd., of Hull, and will be replete with all the latest improvements for the fishing trade. Powerful triple-expansion engines will be fitted by Messrs. Amos & Smith, Ltd., of Hull.

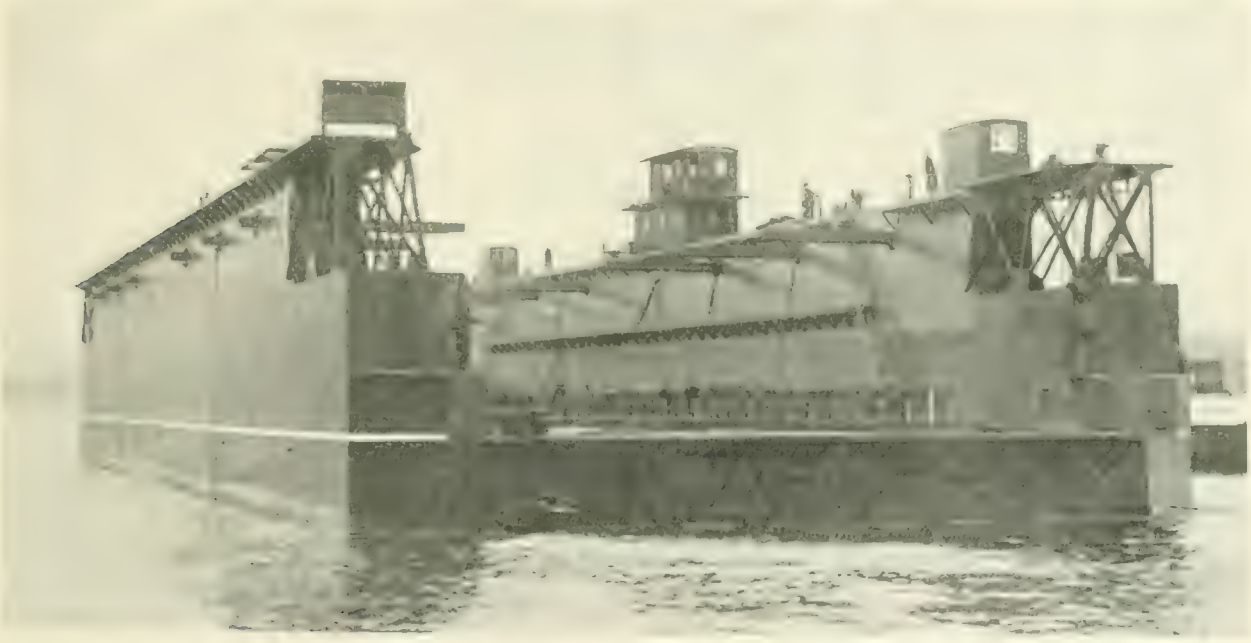
Hopper Barge.—On August 10th, the Blyth Shipbuilding and Dry Docks Co., Ltd., launched from their shipbuilding and graving dock works a 600-ton steam hopper barge, built to the order of the North-Eastern Railway Company, which has been specially constructed in connection with their various docks and harbours. Powerful propelling machinery will be supplied by Messrs. Amos & Smith, Ltd., of Hull. This steam barge is a duplicate of the vessel recently launched by the Blyth Shipbuilding and Dry Docks Co., Ltd., for the Railway Co., and has been built to class 100 A1 Lloyd's, to specification of T. M. Newell, Esq., chief dock engineer to the N.E.R., and under the general supervision of G. Shaw, junr., Esq.

Egremont Castle.—On August 11th, Messrs. Craig, Taylor and Co., Ltd., launched from their Thornaby shipbuilding

yard, Thornaby-on-Tees, a very handsomely modelled screw steamer of the following dimensions [illegible] 426 ft. by 52 ft. [illegible] in. by 32 ft. moulded. She is built of steel on the Isherwood system of construction to the highest class in Lloyd's Registry, under special survey, and has poop, bridge and top gallant forecastle, water ballast in double bottom fore and aft and in peaks. The double bottom also has been specially constructed for the carriage of oil fuel. She is equipped with patent direct steam windlass with quick warping ends, steam-steering gear, eleven steam winches, large multitubular donkey boiler, teak wheelhouse, fire-extinguishing service throughout, telescopic masts to Manchester Ship Canal requirements, special derrick arrangement, including 30-ton derrick, and all the latest improvements for rapid loading and discharging. The accommodation for captain, spare rooms and officers is neatly fitted up in deck-houses amidships, the engineers being in deck-house alongside engine casing and the crew in the forecastle. A complete installation of electric light on the double wire principle is being fitted by the Sunderland Forge Co. Steam heaters are also fitted to accommodation. Her engines have been constructed by Messrs. Blair & Co., Ltd., Stockton-on-Tees, the cylinders being 28 in., 46 in., 74 in. by 48 in. stroke with three boilers working at 180 lbs. pressure, with Howden's forced draught, feed heater, feed filter, winch condenser, two 15-ton evaporators, self-tipping ash-hoist, etc. The vessel has been built to the order of the Lancashire Shipping Co., Ltd. (Messrs. James Chambers & Co.) Liverpool.

Meroe. On August 12th Messrs. Sir Raylton Dixon and Co., Ltd., launched from their Cleveland Dockyard, Middlesbrough, a fine steel screw passenger and cargo steamer which is being constructed to the order of Messrs. James Moss and Co., of Liverpool. Her principal dimensions are 345 ft. B.P. by 45 ft. 6 in. by 27 ft. 6 in. depth moulded. She is being constructed to the highest class at British Corporation and is of the two-deck type with poop, bridge and forecastle with large promenade deck above bridge. On the bridge deck is situated entrance hall and lounge for first-class passengers, also first-class dining saloon and smoke-room luxuriously and tastefully furnished. Below the bridge room handsome state-rooms are provided for about sixty-six first-class passengers. On the poop deck a large steel house is erected to contain steering gear, second-class entrance hall and lounge, while below state-rooms suitably equipped are provided for about thirty-eight second-class passengers with large dining saloon. The vessel has four holds, four hatches, two masts, eight derricks, and will be equipped with [illegible] steam windlass, steam winches, special steering gear and telemotor control. A complete installation of electric light and bells will be fitted throughout the vessel. She will also be equipped with all the most modern appliances for the rapid handling of cargo. Triple-expansion engines having cylinders [illegible] in., 41 in. and 7[illegible] in. by 48 in. stroke, supplied with steam by three large single-ended boilers 15 ft. 6 in. by 11 ft. 6 in. working at 180 lbs. pressure will be fitted by Messrs. John Dickinson & Sons, Ltd., Sunderland.

City of Birmingham. On August 19th, there was launched from the Hebburn yard of Messrs. Palmer's Shipbuilding and Iron Co., Ltd., the handsomely-modelled steel screw passenger and cargo steamer *City of Birmingham*, built to the order of the Ellerman Line, Ltd. The vessel is about 370 ft. long, is built of steel, and is rigged as a two-masted fore-and-aft schooner. She has been built to the highest class in Lloyd's Registry. She has accommodation for about 130 first-class passengers on the shelter and bridge decks, with smoke-room and lounge on boat-deck over; and for about forty second-class passengers at the forward end of poop. The vessel is to be fitted with a large outfit of steam winches and derricks for the rapid manipulation of cargo. She has ample refrigerated provision rooms for the passengers, and will be lighted with electricity throughout. She is to be fitted by her builders with quadruple-expansion engines to give a good speed.



New Floating Dock for Wilton's Engineering Co., Rotterdam.
Built by Messrs. Swan, Hunter & Wigham Richardson, Ltd. Launched September 5th.

Cornwood. There has been launched on the Wear the steamer *Cornwood*, built to the order of Messrs. Wm. France, Fenwick & Co., Ltd., of London and Sunderland. The vessel is of the collier type, carrying [illegible] tons on a moderate draught, with raised quarterdeck and full poop, absolutely clear holds, and large [illegible] hatches. Engines will be fitted by the North-Eastern Marine Engineering Company, Ltd., at their Sunderland works. Messrs. Wailes, Dove & Co.'s "Bitumastic" enamel has been applied to holds, builders' cellular double bottoms, also their "Bitumastic" covering to the fuel tops. A Cochran (Annan) Donkey Boiler with Patent Seamless Furnace has been supplied and fitted.

Rawson. There has been launched on the Wear the steamer *Rawson*, which has been built to the order of the Argentine Navigation Company (Nicolas Mihanovich), Ltd. The *Rawson* has accommodation for about 150 first-class, and [illegible] third-class passengers. She will carry about [illegible] tons deadweight, and is equipped with a complete cargo gear including steel derricks for ten and twenty-ton lifts. The

propelling machinery consists of triple expansion engines, and large [illegible] forced draught. Messrs. Wailes Dove & Co., Ltd., have enamelled tars been applied to engine [illegible] tanks and their patent "Bitumastic" coating [illegible] A Cochran (Annan) Donkey Boiler with Patent Seamless Furnace has been supplied and fitted.

Two Steel Screw Tugs.—The Goole Shipbuilding and Repairing Company have recently launched from their Victoria Shipyard, Goole, two handsomely-modelled steel screw tugs, of the following dimensions: Length over all 105 ft. 6 in. by 23 ft. by 12 ft. The vessels have been built to Lloyd's class and under special survey and are fitted with steam windlass, steam steering gear and nice cabin accommodation. The vessels are to be fitted with Salvage Pumping Plant. Triple expansion engines of large power will be fitted by Messrs. Earle's Shipbuilding and Engineering Co., Ltd., of Hull. The vessels are being built to the order of The Argentine Navigation Company (Nicolas Mihanovich), Ltd. These are the last two tugs of four that the firm have built for the same owners.

Harfat.—On August 12th, there was launched at Northwich a screw steamer for Messrs. John Bacon, Ltd., of the following dimensions: Length, 95 ft.; breadth, 20 ft. 6 in.; depth moulded, 7 ft. 3 in. The vessel was named *Harfat*.

Steam Whalers.—On August 15th, at the shipyard of Messrs. Smith's Dock, Company, Ltd., Middlesbrough-on-Tees, the launch took place of three finely modelled steam whaling vessels, 110 ft. long, which have been built to pass the requirements of the British Corporation.

Tysla.—On August 17th, Messrs. Wm. Doxford and Sons, Ltd., launched from their yard at Pallion the shelter deck vessel *Tysla*, built to the order of Messrs. Fearnley & Eger, Christiania. The dimensions are: Length, 405 ft.; breadth, 53½ ft. moulded; depth, 28 ft. 10 in. The deadweight capacity will be 8,750 tons on a moderate draught. The engines and boilers are being supplied by Messrs. Doxford. The vessel has been built to the British Corporation and Norwegian Veritas classifications.

Overton.—On August 24th, there was launched from the yard of Messrs. Jos. T. Eltringham & Co., South Shields, a finely modelled steel screw cargo steamer, which has been specially designed for the coasting trade, and which is being constructed to the order of the Overton Steamship Co., Ltd., of Liverpool. Messrs. Eltringham & Co. have also under construction a duplicate vessel for the same owners.

Borodino.—On August 24th, there was launched from the yard of Earle's Shipbuilding & Engineering Co., Ltd., Hull, a finely modelled steel screw steamer built to the order of Messrs. Thos. Wilson, Sons & Co., Ltd. She is intended for the Russian passenger and cargo trade. The length of the vessel is 318 ft., breadth moulded 42 ft., depth moulded 19 ft. 11in. She has been constructed of steel throughout to British Corporation highest class, and to Board of Trade latest requirements. The vessel is of the shelter deck type, and the accommodation consists of state rooms for about 27 first-class passengers, spacious dining saloon, lavatories, bath rooms, etc., all the cabins being well lighted and ventilated and well furnished, to ensure the comfort of passengers. She has two steel pole masts and very efficient appliances for the speedy handling of cargo, the derricks being capable of dealing with heavy lifts; the derricks will be worked by powerful steam winches of the most up-to-date description; and a steam windlass by Messrs. Emerson, Walker & Thompson will also be fitted. The steering engine is placed in deckhouse aft, and is worked by the telemotor system from the navigating bridge; powerful hand screw gear is also provided, both of which have been supplied by Messrs. Amos and Smith, Hull. The ship will be fitted up with electric light and bell installation; the saloon, officers' and engineers' living rooms are all heated by steam, and the work throughout the vessel is of the very best description with the latest improvements. Triple expansion engines are provided by the builders, steam being supplied by two large steel boilers, designed to drive the vessel at a good speed on a minimum coal consumption.

Rena.—On August 24th, this steamer, built by Messrs. Wm. Doxford & Sons, Ltd., Sunderland, for Wilh. Wilhelmsen, Esq., of Tonsberg, was launched at the Pallion Yard. She is a sister vessel to the *Aina* recently completed by the same firm. The steamers are 8,750 tons deadweight, and have a voyage speed of 11 knots fully loaded. She is fitted with triple expansion engines, and Howden's forced draught boilers. She has been built to Norwegian classification under special survey.

Oristano.—On August 25th, there was launched from the yard of the Northumberland Shipbuilding Co., Ltd., Howdon-on-Tyne, the s.s. *Oristano*, which has been built to the order of Messrs. Furness, Withy & Co., Ltd., West Hartlepool. The vessel is 390 ft. long by 49 ft. beam by 29 ft. deep, and has been built under special survey to the highest class at Lloyd's. She is fitted with long bridge, long poop, topgallant forecastle, the accommodation which is ample being placed in steel houses on the bridge deck. Careful attention has been devoted to the loading and discharging gear, and a complete outfit for the rapid handling of cargoes arranged for, consisting of nine steam winches by Messrs. Clarke, Chapman & Co., Ltd., Gateshead-on-Tyne, a large number of cargo derricks and steam windlass by Messrs. Emerson, Walker & Thompson Bros. She is fitted with the usual water ballast arrangements for light passages. The machinery is to be supplied by Messrs. Richardsons, Westgarth & Co., Ltd., Sunderland, consisting of engines with cylinders 25, 41, 69, by 48 in. stroke, three large steel boilers with 180 lbs. pressure. The vessel will carry about 7,500 tons on a light draught, and steam about 10 knots loaded at sea.

Aquamarine.—On August 26th, there was launched from the yard of Messrs. Cochrane & Sons, Selby, a steel screw trawler, the principal dimensions being 140 ft. by 24 ft. by 13 ft. 6 in. moulded. The vessel has been built to the order of Messrs. The Kingston Steam Trawling Co., Ltd., of Hull, and will be replete with all the latest improvements for the fishing trade. Powerful triple expansion engines will be fitted by Messrs. Amos & Smith, Ltd., of Hull.

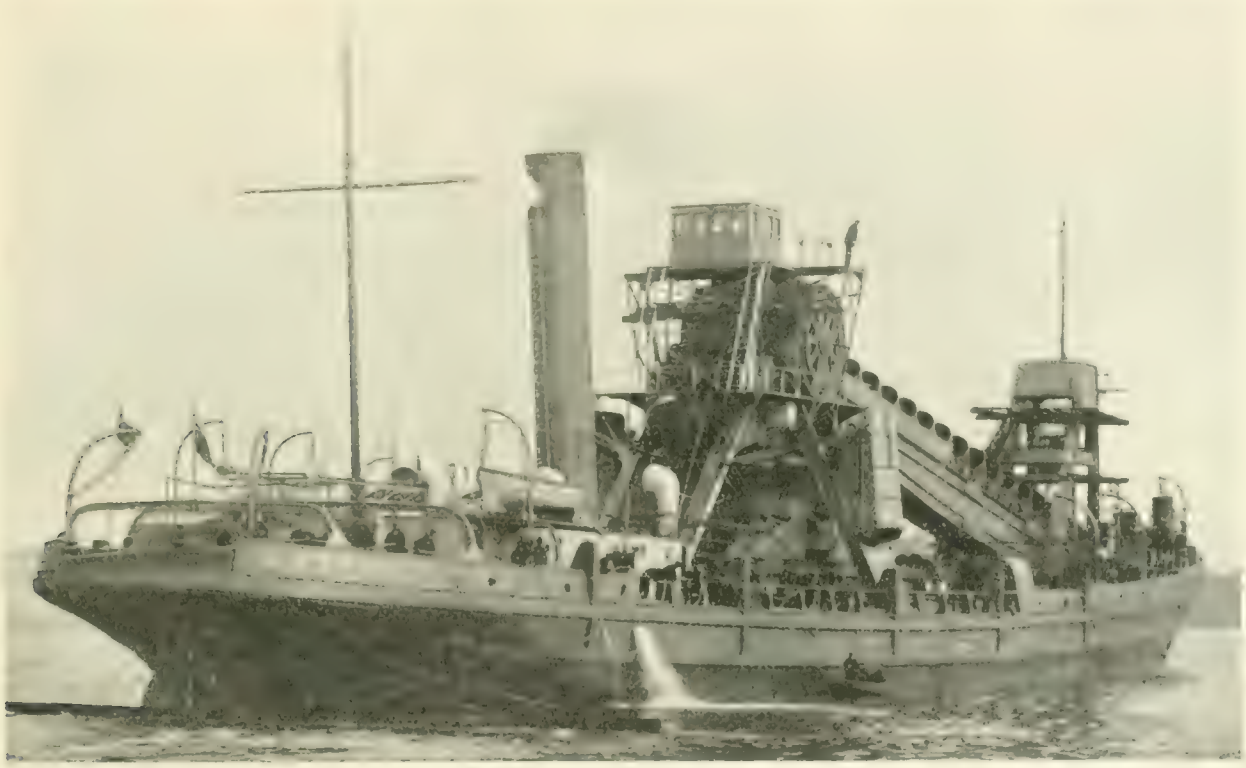
Vryhandel.—On August 28th, Messrs. Irvine's Shipbuilding and Dry Docks Co., Ltd., launched from their Harbour Dockyard the steel screw steamer *Vryhandel*, built to the order of Messrs. Scheepvaart Maatschappij Gylsen, Antwerp. The dimensions are: 289 ft. 6 in. by 40 ft. 2 in. by 20 ft. 6½ in. The vessel has a single deck, with poop, bridge and topgallant forecastle, and has been built to the British Corporation Registry's highest class. A double bottom is fitted throughout on the cellular principle, and the after peak is arranged as a trimming tank. She is constructed with bulb angle frames and longitudinal stringers, giving clear holds for the stowage of bulky cargoes. Four watertight bulkheads divide the vessel into five watertight compartments; there are four large cargo hatches, with a steam winch to each; the bulwarks have been specially strengthened for the carriage of deck cargoes, and the vessel is replete with all the latest improvements for loading and discharging expeditiously. A powerful quick warping steam windlass is fitted forward for working the cables, and steam steering gear is fitted amidships, with hand screw gear aft, and a large multitubular donkey boiler is also fitted. Accommodation for the captain, officers and engineers is arranged in deckhouses amidships, the crew and firemen being berthed in the forecastle. The cabins are heated with steam, and the sanitary, ventilating and lighting arrangements are effected on the most improved lines. Triple expansion engines will be supplied and fitted by Messrs. Richardsons, Westgarth & Co., Ltd., Hartlepool, having cylinders 20½ in., 33 in., and 54 in. by 36 in. stroke, with two large single-ended boilers, working at a pressure of 180 lbs. per square inch. The trial trip was run on the 16th September, the engines working smoothly and a speed of about 11 knots being obtained. A Cochran Annan Donkey boiler with patent seamless furnaces has been supplied and fitted.

Hampshire Coast.—On September 7th, Messrs. W. Harkess & Son, Ltd., launched from their yard at Middlesbrough a steel screw steamer, 195 ft. by 30 ft. by 13 ft. 10 in. moulded, built to the order of Messrs. F. H. Powell & Co., of Liverpool. She is designed with large cubical capacity to carry 1000 tons on very light draught. She has extra large self-trimming hatchways and clear holds, and is fitted with heavy deck machinery of modern type for the quick handling of cargoes. Her engines will be fitted by Messrs. Richardsons, Westgarth & Co., Ltd., of Middlesbrough, and are capable of driving her a

speed of 10½ knots loaded.

Cotovia.—On September 7th, Messrs. Irvine's Shipbuilding and Dry Docks Co., Ltd., launched from their Middleton Shipyard, Hartlepool, the steel screw steamer *Cotovia*, built to the order of Messrs. Knowles & Foster, of London, for the Frumentum Steamship Co., Ltd., and designed by Joseph Temperley, Esq., of London. The dimensions of the steamer are: 380 ft. by 50 ft. 3 in. by 27 ft. 5 in. depth moulded, having a deadweight carrying capacity of over 6,500 tons on a light draft. She is of the single deck type, with poop, bridge and forecastle, and is built to Lloyd's highest class. Water ballast is carried in cellular double bottom, also in an extra large after peak tank. The *Cotovia* is constructed with deep bulb angle frames, with no side stringers, giving exceptionally clear holds, the vessel having been specially designed and constructed for the owners' grain trade on the South American Coast. Six watertight bulkheads are fitted, dividing the vessel into seven watertight compartments; there are seven large hatches specially arranged for the use of grain elevators, six powerful steam winches are fitted, and all the latest improvements are included for the rapid loading and discharging of cargo. A powerful quick warping steam windlass is fitted forward, and steam steering gear amidships, with hand screw gear aft. The captain, officers and engineers will be berthed in houses amidships, and the sailors and firemen in the poop. The lighting, ventilating and sanitary arrangements have received special attention, the most improved methods being adopted throughout. Triple expansion engines will be supplied and fitted by Messrs. Richardsons, Westgarth & Co., Ltd., Hartlepool, having cylinders 25 in., 40 in., and 68 in. by 48 in. stroke, with three large boilers, working at a pressure of 180 lbs. per square inch. A feature in the design of the machinery is the adoption of the complete "Contraflo" system of condensing and feed heating. This consists of both main and auxiliary condenser of the Contraflo type, independent feed pumps, cascade filter, and a special design of feed heating arrangement, whereby the whole of the auxiliary exhaust steam is utilised, and the evaporator is of the Morison vertical radial type.

Redesmere.—On September 7th, the *Redesmere*, built to the order of Messrs. Herbert Watson & Co., of Manchester, for the Watson Steamship Co., Ltd., was launched from the yard of the Sunderland Shipbuilding Co., Ltd. Her principal dimensions are: Length B.P., [illegible] ft.; breadth, 42 ft. 8 in.; and depth moulded 21 ft. 9 in. She is a single decker, having poop, bridge and top-gallant forecastle, and will take Lloyd's 100 A1 class. Four derricks on tables are fitted to each mast for working the four hatches. The deck machinery consists of six large steam winches, direct steam windlass, and a steam steering gear fitted up at after end of bridge, the whole being worked by a large horizontal donkey boiler. Accommodation is provided in houses on bridge for captain, officers and engineers, the sailors and firemen being berthed in the forecastle. The saloon is placed amidships, and is very tastefully fitted up. The whole of the accommodation, including the crew's quarters, is heated by steam. The main engines are supplied by the North Eastern Marine Engineering Co., Ltd., Sunderland, and have cylinders 21 in., 35 in., and 57 in. by 39 in. stroke, steam being supplied by two large boilers working at a pressure of 180 lbs. per square inch.



Bucket Hopper Dredger *Corozal*, built by Messrs. Simons & Co., Ltd., Renfrew, for United States Government.

Cayo Romano.—On September 8th, Messrs. William Dobson & Co. launched from their shipbuilding works at Walker a steel screw steamer for Messrs. Ernest Bigland and Co., of London, for their Cuban-Mexican trade. The vessel is built to the highest class at Lloyd's, and has the following dimensions: Length between perpendiculars, 354 ft., breadth 48 ft., depth moulded 28 ft. 5½ in. The model is exceptionally fine and there are two decks laid, with poop, bridge and forecastle above. The [illegible] machinery is of the usual triple expansion type, and it has been constructed by the North Eastern Marine Engineering Co., Ltd., of Wallsend. The cylinders are 25, 41 and 67 inches diameter, with 45 in. stroke. Steam is supplied by three single ended boilers, working with Howden's system of forced draught.

LAUNCHES—Scotch.

Coramba.—On August 18th, there was launched at [illegible] which has been built to the order of the North Coast Steam Navigation Company, Sydney, N.S.W. The vessel has been constructed to the special class of the British Corporation. The vessel was designed by Mr. Charles M'Allister, Sydney, N.S.W.

Clenetive.—On August 22nd, there was launched at Whiteinch the steamer [illegible] which has been built for Messrs. [illegible] Gardiner & Co., Glasgow. The vessel, which has been constructed to Lloyd's highest class, is of [illegible] Triple expansion engines will be supplied. Messrs. Matthew, Keenan & Co., Ltd., have completed the contract for boiler and pipe covering on board.

Maunganui.—On August 24th, the twin screw steamer *Maunganui* was launched by the Fairfield Shipbuilding and Engineering Co., Govan, for the Union Steamship Company of New Zealand. The vessel is 430 ft. in length, 55 ft. 6 in. in breadth, 42 ft. 6in. in depth to promenade deck, and of about 7,000 tons gross. She is divided into nine watertight compartments, and there are five decks—boat, promenade, upper, main, and lower. Accommodation is provided for 244 first-class, 175 second-class, and 80 third-class passengers, and for a crew of 136 men. There is a spacious entrance hall which contains the main stairway leading to the upper deck, and the lounge and music room and smoking lounge are on the promenade deck. Forward of the main stairway there is a dining saloon over 50 ft. in length and extending the full width of the vessel. The tables are arranged on the café principle, and are capable of sitting 144 persons. The second-class dining saloon has sitting accommodation for 110 persons. The first-class staterooms are on the Bibby system, with berths for one, two, or three persons. Forward of the main saloon is the third-class saloon, with seating accommodation for 58 persons, and state-rooms adjacent. The propelling machinery will consist of two sets of quadruple-expansion balanced engines. Steam at a pressure of 220 lbs. will be supplied by two double-ended and two single-ended cylindrical boilers adapted for forced draught.

Swift.—On August 26th, Messrs. Ramage & Ferguson, Ltd., launched from their shipbuilding yard at Leith, a finely modelled steel screw steamer built to the order of the General Steam Navigation Co., Ltd., of London, for their Continental trade. Built to the highest class at Lloyd's, awning deck type with bridge amidships; the principal dimensions are: 245 ft. B.P. by 34 ft. 5 in. by 24 ft. 3 in. depth to upper deck. Triple expansion engines with cylinders 23 in., 37½ in., 62 in. diameter by 39 in. stroke, and large boilers working if required under forced draught supply the propelling power and a high rate of speed is expected at sea. The latest cargo appliances are fitted, among which may be noted seven powerful steam cranes and electric lighting is installed throughout.

Morialta.—On August 28th, there was launched from the yard of Messrs. David & William Henderson & Co., Limited, Partick, Glasgow, a finely modelled twin screw steamer, which they have built to the order of The Adelaide S.S. Co., Ltd., Adelaide, South Australia. The dimensions of the vessel are: Length between perpendiculars, 240 ft.; breadth moulded, 40 ft.; depth moulded, 16 ft.; and is built to the requirements of the British Corporation for their highest class. Designed for the passenger coasting trade, she is fitted up in a highly finished manner for 150 first-class passengers, for whom the vessel is replete with everything that can add to their comfort; the staterooms being large and airy, so as to be suitable for the Australian trade. The propelling machinery, which has also been constructed by the builders, consists of two sets of triple expansion engines, each having cylinders 16 in., 27 in., and 43 in. diameter by 33 in. stroke, two water tube boilers by Babcock & Wilcox, for a pressure of 200 lbs. The *Morialta* is the sixth vessel built by Messrs. Henderson for the Adelaide Co.

Strathtummel & Strathurie.—On August 28th, there were launched at Aberdeen two trawlers, built to the order of the Aberdeen Steam Trawling & Fishing Co. The vessels are of the following dimensions: Length, 115 ft.; breadth, 22 ft.; and depth, 13 ft. Triple expansion engines will be supplied. The vessels were named *Strathtummel* and *Strathurie*.

Essex Abbey.—On August 31st, there was launched at Greenock the screw steamer *Essex Abbey*, which has been built to the order of Messrs. H. Meldrum & Co., London. Her dimensions are: 350 ft. by 50 ft. 6 in. by 26 ft., and she will carry a total deadweight of 6,250 tons on 21 ft. 6 in. draught. The engines will be of 1,700 indicated horse power. Captain Walker will command the ship on delivery to her owners.

Hopper Barge.—On September 5th, there was launched at Port Glasgow a first-class hopper barge for the Port of London Authority. The vessel was put into the water with steam up, being almost completed and ready for sailing. She is fitted with all the latest appliances, is 200 ft. long, and has a tonnage of 600.

Kuala.—On September 6th, there was launched at Dundee a screw steamer named *Kuala*, built to the order of the Straits Steamship Company, Singapore. She is built to the highest class in the British Corporation Registry for special trading, and also to the Board of Trade requirements for carrying passengers and cattle. The principal dimensions are: Length over all, 236 ft.; breadth moulded, 35 ft. 6 in.; and depth moulded, 14 ft. 2 in. The vessel has a long poop and bridge combined, and a topgallant forecastle. The saloon is in a large deckhouse on the bridge amidships, with state-rooms adjoining, and also on the deck above. In the deckhouse aft there is accommodation for second-class passengers. The machinery consists of triple expansion engines, with cylinders 18 in., 28½ in., and 48 in. diameter respectively, and a stroke of 33 in. Steam is supplied by two large steel boilers working at a pressure of 185 lbs. A Cochran Annan Donkey Boiler with patent seamless furnace has been supplied and fitted.

Emerald Wings.—On September 6th, there was launched at Port Glasgow the steamer *Emerald Wings*, which has been built to the order of Messrs. Norman Hallett & Co., London. This vessel is a duplicate of the steamer *Bright Wings*, built for same owners. The vessel has been designed for a deadweight carrying capacity of 5,500 tons, on an exceptionally light draught. She has been built to Lloyd's highest class on a very full specification.

Lord Bacon.—On September 9th, there was launched at Greenock the steamer *Lord Bacon*, which has been built for a Liverpool firm of shipowners. The vessel is one of 360 tons, and is intended for the coasting trade. She is a sister ship to the *Lady Bacon*, put into the water about two months ago. The new steamer will be engined in Glasgow.

Corozal.—On September 12th, Messrs. Wm. Simons and Co., Ltd., Renfrew, launched an extremely powerful bucket hopper dredger which they have built to the order of the United States Government for carrying out some of the most arduous under-water cutting to be done in connection with the Panama Canal. The dredger is of the twin screw type, and will make the voyage to the Pacific Coast under its own steam. The vessel has a hopper capacity for 1,200 tons of dredgings. The bucket ladder is designed for dredging up to a depth of 50 feet. The vessel, which has been named *Corozal*, is propelled at a speed of 10 knots per hour by two sets of triple expansion surface condensing engines supplied with steam from two cylindrical multitubular boilers, constructed to Lloyd's requirements for a working pressure of 180 lbs. per square inch. A complete outfit of the most modern auxiliary machinery is provided in the engine room, including independent air pumps, circulating pumps, feed pumps, feed heater and filter, etc. The dredging gear is of the most massive description, and is arranged to give three speeds of buckets to suit the various kinds of material to be dealt with. The dredging gear can be driven by either of the main propelling engines. Two sets of buckets are provided, one of 54 cubic feet capacity for dredging soft material, and one of 35 cubic feet capacity for dredging stiff clay. The bucket ladder is a steel girder of exceptional strength, and an idea of the enormous strength of the bucket chain may be conveyed by the statement that the ladder with its chain of buckets, links and pins, weighs upwards of 240 tons. The upper end of bucket ladder is supported on independent pivot shaft and the lower end is controlled by powerful steel wire rope tackle and independent steam hoist gear which is designed for raising the ladder at a speed of 10 feet per minute. Steam manœuvring winches are fitted at bow and stern, each driven by independent two-cylinder engines, and each

and Wigham Richardson, Ltd., of Wallsend-on-Tyne, for Messrs. Elder Dempster & Co., Ltd. A series of runs were made on the measured mile near the mouth of the Tyne, and an average speed of 12¾ knots was attained. The main engines and boilers have been built by the Wallsend Slipway and Engineering Company, the three large boilers being equipped with forced draught. The leading dimensions of the *Bengaria* are: Length over all, 436 ft.; beam, 53 ft.; and moulded depth, 32 ft. Her deadweight carrying capacity is about 9,000 tons. Although primarily a cargo boat, the vessel has accommodation for first-class passengers amidships. The accommodation for the crew has been carefully planned, and is more spacious and comfortable than usual. In the holds a space of some 10,000 feet has been insulated and refrigerated. The 'tween decks have sidelights, and are planned so as to be fitted for troops in case of need, or, alternatively, to carry cattle. Electric light is fitted throughout the ship, and also fire-extinguishing apparatus, and an ample service of fresh water. An unusually fine equipment has been provided for handling cargo, with an extra large number of winches and powerful derricks to lift weights up to 30 tons.

Clan Mackenzie.—The large shelter deck steamer *Clan Mackenzie*, built and engined by Messrs. Wm. Doxford and Sons, Ltd., Sunderland, to the order of the Clan Line Steamers, Ltd. (Messrs. Cayzer, Irvine & Co., Ltd.), Glasgow, ran a successful sea trial recently, when a speed of 14 knots was obtained. See Launches, July.

Brisbane.—On August 19th, the *Brisbane*, the latest addition to the fleet of the Deutsch-Australische D.G., of Hamburg, sailed from the Tyne. This vessel has been built at the Neptune Works of Messrs. Swan, Hunter and Wigham Richardson, Ltd., and is intended for service between European and Australian ports. She is 444 ft. in length by 57¾ ft. beam, and has been constructed to attain the highest class in Lloyd's register. She will carry 9,300 tons deadweight, and her auxiliary machinery and appliances, both for manœuvring the steamer herself and for working her cargo, are of the most improved description. Her masts are arranged for wireless telegraphy. The propelling machinery consists of a set of powerful triple-expansion engines, supplied with steam from four large single-ended boilers, fitted with Howden's forced draught. The whole has been made at the Neptune Works. On the trial trip everything worked very satisfactorily, the speed attained being about 13½ knots.

Sangstad.—On August 23rd, the first-class large steamer *Sangstad*, built by Messrs. Robert Thompson and Sons, Ltd., at their Southwick Yard, to the order of Messrs. A. F. Klaveness & Co., of Lysaker, Norway, was taken out to sea for her official trial. The trial trip was very successful, the engines running with the utmost smoothness, and a mean speed of 11 knots was easily attained, and Captain Raastad on behalf of the owners expressed himself highly satisfied with both vessel and her machinery. After the trial the vessel proceeded to the Tyne to load bunkers. See Launches, September.

Atna.—On August 24th, the steamer, built by Messrs. Wm. Doxford & Sons, Ltd., of Sunderland, for Wilh. Wilhelmsen, Esq., of Tonsberg, went on her trial trip, when a speed of 12½ knots was registered on the measured mile. She proceeded to take up her position at the berth to load for Australia, being one of the new Norwegian-Australian Line steamers. See Launches, September.

Glenbridge.—On August 30th, the new *Glenbridge* proceeded on her official trial trip in Hartlepool Bay. Throughout the trial the engines and all auxiliaries worked very smoothly, and as a result of a long trial, extending over six hours, a speed of 11 knots was obtained, the owners expressing entire satisfaction. See Launches, September.

Trevalgan.—On August 30th, the new screw steamer *Trevalgan*, built by Messrs. John Readhead & Sons, Ltd., West Docks, South Shields, to the order of Messrs.

The Remains of the *Liberté* in Toulon Harbour (see page 66).

The damage done to the *Republique* by the blowing up of the *Liberté* (see page 66).

Edward Hain & Son, St. Ives, Cornwall, was taken to sea on her official trial trip. After the trial, which was in every way satisfactory to all concerned, the vessel returned to the Tyne to load for Port Said under the command of Captain Uren. See Launches, September.

Normanby. On August 31st, the handsome steel screw steamer, *Normanby*, built by Messrs. Wm. Gray & Co., Ltd., to the order of The London & Northern Steamship Company, Ltd. (Messrs. Pyman Bros., London, managers), had her trial trip. The usual manœuvring for adjustment of compasses, etc., having been accomplished, a run along the coast was made to Whitby, during which the performance of both ship and machinery was highly satisfactory, the engines running smoothly and well, and the mean speed of ship being 12½ knots.

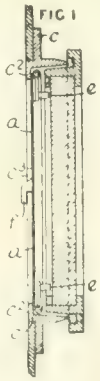
Siamese Prince. On September 2nd, the *Siamese Prince*, built by the Sunderland Shipbuilding Co., Ltd., to the order of Mr. James Knott for the Prince Line, Ltd., was taken to sea on her official trial. The trial was in every way most satisfactory, everything worked well, and a mean speed of 11¾ knots was easily maintained. There was a large and representative company on board, and those present on behalf of the owners expressed themselves as very highly pleased with the vessel and machinery. On completion of the trial the steamer proceeded direct to New York, to take her place in the owners' trade, for which she has been specially designed. See Launches, August.

The Marine Engineer and Naval Architect Patent Record.

Compiled by Messrs. E. P. Alexander & Son, Chartered Patent Agents, 306, High Holborn, London, W.C.

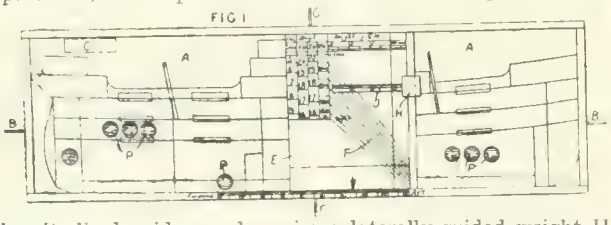
11,314. Cabin and Deck Lights. A mosquito screen is adapted to be placed within the frame of a side or port light, and to be secured therein in such a way as to enable the glass holder to be closed or opened when the screen is in position. The mosquito screen A is provided on one side with finger pieces E to facilitate its manipulation, and on the other side with hoops or tongues F, which are passed through gaps C^3 in a ledge C^2 on the frame C, the screen being then rotated to cause the hooks F to engage the ledge C^2. Alternatively, the hooks F may engage projections on the frame C.

FIG 1



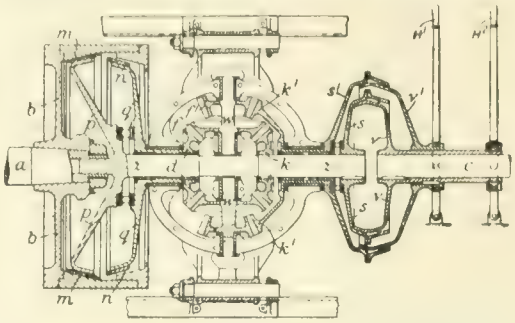
11,561. Determining Stability. Apparatus for determining the trim and metacentric height comprises a table A bearing a longitudinal profile diagram of a ship and supportable alternatively upon longitudinal and transverse horizontal pivots B, C. A platform E of determined weight slides in

FIG 1



longitudinal guides, and carries a laterally-guided weight H having a graduated arm J working across calculated "G.M." lines F. A weight O proportional to the light weight of the ship is then placed on the table so that the whole balances on either pair of pivots. Loose weights P indicating cargo and the like are then placed in assumed positions. The scale J is adjusted until the table balances about its longitudinal pivots, and the metacentric height is read on the scale J at the point cut by that one of the "G.M." lines for the dead weight that the weights P represent. The fore-and-aft trim is obtained by moving the platform E until the table balances about the transverse pivots C.

11,821. Driving Gear for Boat Propellers. A reversing-gear for screw propellers is modified to give a change speed drive ahead or astern. An intermediate shaft *z*, arranged between the motor shaft *a* and the propeller shaft *c*, carries at its ends clutch discs *p*, *s* which can co-operate with clutch discs *b*, *c* on the motor shaft and propeller shaft, respectively. By operating a lever H^2 the shaft *z* can be directly clutched up to the shaft *a*, or a reverse motion can be obtained through



a loose clutch disc *q*, which co-operates with the conical surface *n* and the gear-wheels *d*, *f*, *k*. The spindles *w* on which the intermediate gear-wheels *f* are mounted also carry wheels f^1 gearing with a wheel k^1 loose on the shaft *z* but integral with a clutch disc s^1, so that by operating a clutch disc v^1 through a lever H^1 the propeller shaft can be connected through the reducing-gear directly with the shaft *z* or with the loose clutch disc *q* and thus give a drive at reduced speed ahead or astern.

A BRAVE ENGINEER.

THE Cunard line steamship *Carmania* had to put into Halifax on her outward voyage from Liverpool towards New York at the beginning of September. The cause of this visit—a most unusual thing nowadays for high-class passenger steamers—was said to be the inefficiency or shortness of supply of the coal which she had taken on board at Liverpool during the shipping strike. But there was also machinery trouble, and it became necessary to shut off one of the turbines. Time was of course of the greatest importance—for time had been lost in huge quantities over the strike—and it was of the highest importance to avoid delay while the machinery cooled off to get at the valves. The temperature of the space into which entrance had to be effected to deal with the stop-valve is said to have been 200 degrees Fahrenheit. The chief engineer called for volunteers to close the valve and Mr. A. C. M'Cutchon, the third engineer, stepped forward and was accepted. He endured this temperature for something like ten minutes, whilst he effected his purpose, and thereby saved the steamer about twenty-four hours' delay. It is said that he failed five times to effect the operation, but exhausted and almost unconscious he did the work on the sixth attempt.

EXHIBITION OF NON-FERROUS METALS.—An international exhibition of metals other than iron and steel is in course of arrangement by Mr. Fred. W. Bridges (organizing manager), under the presidency of Sir Gerard A. Muntz (president, Institute of Metals). The Royal Agricultural Hall, Islington, has been booked for the occasion, from May 6th to 18th next year, and the prospectus is about to be issued to the trades concerned and those interested in metal work of all kinds. Judging from the experience which the organizing manager has gained in previous exhibitions he has been connected with, and the results achieved, the success of the exhibition now being organized is assured, and we join in best wishes for the attainment of such a result.

The Marine Engineer

And Naval Architect.

LONDON, NOVEMBER, 1911.

THE *LIBERTÉ* DISASTER

THE terrible catastrophe which overtook the French navy at the end of September, and of which we gave some illustrations in our last issue, has aroused the most sincere and heartfelt sympathy, not only of the British Naval Service, but of the whole British nation. This calamity has not only cost France a magnificent and useful vessel, but the toll in human life is a heavy one, and has occurred at a time when it seemed that after considerable sacrifice the French navy had been brought up to the standard and position among naval powers which its ancient traditions show it has occupied in the past. Nothing could have excited the admiration of the civilized world more than the splendid and courageous behaviour of those brave men who, taken by surprise in a totally unexpected situation, faithfully obeyed the commands of their officers and went to their doom in silence and with the greatest heroism. An official enquiry is being held on the matter, and we are not desirous in any way of attempting to prejudge the matter, but it may be interesting to review some of the opinions which have been expressed as to the cause of the disaster. It is clear that both a fire and a series of explosions took place, and it will be interesting to ascertain as to whether the fire preceded the first explosion or *vice versa*. If the former, then it might be said that the ammunition was not primarily responsible for the results, but if the latter, then a reverse conclusion must be come to. It is somewhat significant that Admiral Bellin, who is in charge of the Second Battleship Squadron has, if our information is correct, ordered all the B powder and all shells over a given age to be removed from the ships. It has been reported that the Admiral has no doubts in his own mind that the cause of the accident was the spontaneous combustion of the propellant powder in the same way as occurred in the previous case of the *Jena*. It must be understood that there are two distinct types of powder in use, one designed for propelling the projectile from the gun, and therefore of a slow burning character and burning from the surface only in order to reduce the initial pressures, while the other is designed for use in shells so as to set up the highest initial pressure to produce the greatest disruptive effect. Experience has shown that the latter powder, which is termed a high explosive, is very stable in composition and little or no fear is felt as to spontaneous combustion taking place with such powder. The former, however, being of a much more complex nature and much more ready to be influenced in composition under variations of atmospheric conditions and temperature, has for years past aroused feelings of anxiety as to unreliabity, with the result that when used, not only is the greatest care exercised in the manufacture, but most rigid inspection and testing is carried out periodically, and the storage is effected at temperatures considered safe. By reason of these precautions the British navy has been free from those unfortunate accidents which have overtaken other countries.

The slow burning powders may be divided into two distinct classes, those comprising nitro-glycerine and those comprising nitro-cellulose as an essential factor. Our powders are of the first type, and we are associated with Germany, Japan, Italy, Argentine Republic and Brazil in the use of this type, while the second type is used by France, Russia and the United States of America. The countries which have specially experienced considerable trouble and had serious accidents in this matter are France and the United States, while the immunity enjoyed by Russia may be due to the fact that the temperature which her ships are usually in is below that encountered by the ships of the other two countries. A further point to be borne in mind is that the service under steam of the Russian ships is very limited, consequently the accumulation of heat by its long continuance is hardly likely to occur compared with the chance when ships are under steam for long periods, or are cruising or lying in a zone of high temperature. It will be remembered that great naval disasters of this nature in the past include the British sloop *Doterel*, in 1881, and the cause was attributed to patent driers used in painting the ship; the United States *Maine*, at Havana, in 1898, the Japanese *Mikasa*, at Sasebo, in 1905; the Brazilian *Aquitaban*, in 1906; the French *Jena*, in 1907, and the Japanese *Mutsushima*, in 1908. Views expressed at the time of these disasters have been changed from time to time as experience and knowledge have been gained, but the real cause, based on absolutely reliable conclusions, still remains a mystery in nearly every case. There is no doubt that our immunity is in a large measure due to the care and constant supervision where the use of unstable substances is being dealt with, but it is impossible of course to have any idea how near we may ourselves have been to a disaster which the French navy has sustained more than once. We understand the French Minister of Marine has already taken steps to arrange for the laying down of another ship to fill the gap caused by the destruction of the *Liberté*, so that no time is being lost in making good what must be acknowledged to be a serious and sudden depletion of naval strength. Just as we are going to Press we learn that the result of the enquiry is that there is no question of treachery or sabotage in the matter, but that the accident was due to the explosive known as powder B.

INCREASED RESPONSIBILITIES

THE value of money having depreciated to an appreciable extent during recent years, and especially in the course of the present year, the question of increased remuneration to those with fixed scales of pay, became an obvious one for consideration and adjustment by all employers who were not regardless of the rules of equity. The horizon usually betokens the coming of a storm, and certainly signs were not wanting to show to the thoughtful man of business, months before it came, the storm which was brewing in the ranks of industry. Several points in the concessions and in the settlements were not dealt with in a manner conducive to the best interests of the nation, or indeed for that matter to the best interests of either employers or employees, due doubtless to the hurry and rush of things, aggravated by the want of accurate knowledge of the details in connection with the different classes of work. The increases given to the rank and file of seafarers and others have tended, not only to add to the cost of living all round, but have placed at a disadvantage those whose rates of pay were not dealt with in an increased ratio; they have thus been made to realize that they have become less able than formerly to meet the claims upon them financially. When we consider the duties of the sea-going engineer, his responsibilities and the demands continually made upon him to learn new accomplishments and keep himself abreast of the times, we cannot but say that his remuneration should be kept well in advance of those he is called upon to direct and govern in the engine-room and stokehold. He has a fairly long training as an apprentice, he requires to devote much time to study, and has to provide himself with tools and books in order to be prepared for the exigencies of his service as a marine engineer. Our pages have contained records of how emergencies have been met and difficulties overcome by marine engineers, sparing not themselves so they might accomplish work to save the property entrusted to their care, or avoid a detention for the sake of furthering the interests of those they served. The responsibilities of the marine engineer have greatly increased and are yearly increasing owing to the progressive demands upon his resources, and upon his time at sea and in port. To minimise the consumption of fuel and consumable stores, oils, etc., and safeguard the interests of the shipowner by personal attention to details are routine duties, and beyond these he is called upon, according to the special nature of the voyage or trade, to acquaint himself with and oversee systems of refrigeration with all the demands as to preparing the hold chambers for the meat, seeing that it is fit to be received on board, and thus not only to become responsible for the shipment of the cargo, but to exercise a watchful care over it during the voyage, and deliver it sound and good, fit for the market. This is but one of the many additions which have been made to the machinery department of a steamship within the last thirty years or so. Most of the steamship companies have spontaneously increased the pay of their officers, both deck and engine, and there is no doubt they will reap good return for their action. It is wise to recognise the work of those who work with a willing and anxious desire to place duty on a high standard and give due recompense. Those who have been tardy in their recognition of the value of the services rendered by their officers—deck and engine—are being approached by means of letters and deputations in order to have brought before them the desirability of increasing the remuneration of both arms of the mercantile marine service. This applies as well to some of the Government and Harbour Board service vessels and to chief engineers and juniors alike.

LIABILITY FOR SEAMEN'S WAGES

A LEGAL point of considerable interest to the shipping community has been raised in connection with the accident to the *Olympic*. It would seem that after the collision, on the return of the ship to Southampton in a condition so serious as to preclude the voyage being continued, it was decided to patch her up and send her to Belfast for repairs, to dismiss a certain number of the crew, and as a result notices were given and three days' pay was offered in each case. This was refused and a month's pay was asked for, evidently under the provisions of section 162 of the Merchant Shipping Act, which sets out that in the event of a seaman being discharged before a month's wages are earned without any fault on his part and without his consent, then he shall be entitled to receive in addition to the wages he has earned due compensation not exceeding the amount of one month's wages. In order to test the point a seaman and a fireman took action before the Southampton Borough Justices to make the owners of the *Olympic* liable under the section for compensation. The owners in their defence to this action relied on section 158 of the Act, which provides that where the services of a seaman terminate before the date contemplated by reason of the wreck or loss of the ship he shall be entitled to receive wages up to the time of such termination, but not for any longer period. The bench were equally divided and the chairman in announcing the fact stated that the bench were unable to decide as to whether the *Olympic* was a wreck or not. The matter will now have to go to a Superior Court and the short point to be decided will be whether the *Olympic*, damaged as she was and not able to go on her voyage or to be beneficially employed in an ordinary sense, was in point of law a wreck or not. It will be a matter of interest as to what course the Divisional Court will adopt if the

case is appealed, as it must necessarily be dealt with on the question of law as to what a wreck really is in a case such as the one in question, and the Court will have to decide the case in accordance with the evidence after having directed itself on the law involved. If the justices had decided either one way or the other on the question of wreck, as a matter of fact, on the evidence given, the Divisional Court would have only dealt with the law on the subject and have sent the case back to the justices with directions or have confirmed the legal grounds on which their decision was based. Whatever the decision of the Superior Court may be it will serve a useful purpose in making clear the principle upon which such claims can be based, not only for the benefit of the seaman, but also for the shipowner, who naturally wants some legal guide to enable him to form a reliable estimate of his financial liability in the matter of wages in circumstances analogous to those of the *Olympic*. An interesting point would be that if the *Olympic* was not a wreck under the circumstances because it did not touch the ground, would it have been a wreck if the damage had been such as to cause her stern to drop down sufficiently as to rest on the bottom of the Solent? It is quite conceivable that a very small variation in the circumstances might have brought about this result with practically no alteration in the actual damage done to the hull. We await the decision of the Superior Court with interest.

DIRECTOR OF NAVAL CONSTRUCTION

AS forecasted in our columns some time back, Sir Philip Watts, K.C.B., L.L.B., D.Sc., F.R.C., will shortly relinquish his appointment as Director of Naval Construction. He will be succeeded by Sir William E. Smith, at present Superintendent of Construction, Accounts and Contract Work. Sir William Smith joined the Construction Department of the Admiralty in 1873, and has been concerned in the designing and building of several of our famous war vessels. He also designed the *Discovery*, the vessel used in Captain Scott's first Antarctic expedition.

THE FLEETS OF THE MAIL LINES.

The "Olympic" Collision.

THE President of the Admiralty Division of the High Court having already [illegible] the trial of the action arising out of the collision in the Solent between H.M.S. *Hawke* and the White Star steamship *Olympic*, it would not be proper to comment on the actual circumstances of the collision. It may be permitted to remark that some of the incidents arising out of the sudden abandonment of the voyage gave opportunity for some of the passenger steamship companies to show their confidence of art and their power of self-effacement. [illegible] unaware that their vessel was being rammed by a warship.

The Austrian Lloyd,

[illegible]

The United States Wireless Telegraph Act,

[illegible] opened up an interesting point in the Courts on the other side. By the provisions of the said Act all passenger steamships [illegible] United States port with passengers for hire or reward, of [illegible] upwards, must be provided with approved installations of wireless telegraphy [illegible] port. [illegible] ship. It appeared that [illegible] however, that he infringed the law, because it is stated that the person who had signed on as passenger [illegible] putting a man on the articles is not enough to make him a member of the crew, and that it may be that the fact of signing on may only be a colourable way of cloaking up the taking of a passenger. The decision in the Court will be awaited with considerable interest by a good many people besides Captain Jones, of the *Templemore*, who is the actual defendant, and who is liable under the Act [illegible] than five thousand dollars for the breach, if proved. If [illegible] class of passenger [illegible] classes of passenger [illegible] charge. It seemed [illegible] gentlemen [illegible] to be used to increase the master's power of keeping up the discipline of the ship. But it would be curious [illegible] the American Courts would hardly hold that the passage of gentlemen [illegible] the taking of a [illegible] passenger.

The difficulty of deciding

on the power [illegible] that [illegible] any great facility in common use is well known. There has recently been litigation to settle on the [illegible] the invention of [illegible] wireless telegraphy [illegible] of the screw propellor, and so on. Just recently in the [illegible] Now it is only within the last [illegible] in bulk [illegible] Messrs. [illegible] Antwerp, puts forward a prior [illegible] The [illegible] built [illegible] the serious questions involved, looked with [illegible]

pioneers that Messrs. Lennard's venture was an excellent way of meeting the difficulties which presented themselves. Then came Messrs. Armstrong's vessel, which undoubtedly carried the development a step further and made the *Glückauf* more of the modern type of such vessels. But it must be conceded that since the *Glückauf* came out successive vessels of the class have embodied further and further improvements. On that account we cannot disregard the claim of the vessel of 1886 to be a tanker. We regard her as a valued and important link in the chain of development. And if we do this we must also admit that the idea embodied in the earlier *Progress* was also an important contribution to the same development and a step towards that perfection which seems so nearly attained to-day.

The Happenings of the Itala-Turkish War

have so far not been of great importance to the mercantile fleets. A steamship named the *New London*, which, though under the British flag is manned by a Greek crew with a master named Papadaimis, was seized by the Italians and subsequently released, whilst a launch sent out from this country to the Red Sea has been sunk by the vessels of the same power. But there seems every probability that this vessel can be raised. Indeed, the remarkable thing about this war from the naval point of view seems to be that very little damage has been done and throughout the names of the vessels concerned have not been allowed to transpire, so that as yet the record is practically a blank.

Wireless Telegraphy.

The difference of ideas and policy in West and East is strongly emphasized by the treatment of Mr. Marconi's invention in the United States on the one hand and in Russia on the other. We have seen Mr. Jones, master of the *Templemore*, being prosecuted with the utmost rigour of the American law for not carrying an installation, whilst almost at the same time attention is called to the fact that the Russian Government disapproves of "wireless" being fitted to merchant vessels, and notifies that it will only allow installations to be made under most exceptional circumstances. These two extreme cases seem very good arguments for the principle that it is very much better for the State to interfere as little as possible with commercial enterprises. Our own Postmaster-General's Report, recently published, shows that if left to themselves shipowners will adopt and develop useful facilities, for the number of radio-telegrams handled by the Post Office between ship and shore showed an increase of no less than 28·4 per cent. over those of the previous year.

The figures themselves are interesting as showing how much more passengers on board ship want to communicate with the shore than people on shore want to speak to the ship.

	1909-10		1910-11
From shore	3,266	..	3,640
From ship	27,727	..	34,161

This increase is explained by the fact that whereas the number of British ships fitted with installations was but 130 a year ago it is now no less than 290. The fact is that till the last few months only ships on the narrow seas and on the North Atlantic were fitted. Now the mail steamers to Australia and the East, as well as to South America and the Cape, are taking advantage of the facility, and soon—without legislative interference, no passenger steamer under the British flag will be without it. Meanwhile, as the official report says, "many cargo vessels" are also adopting it. To cope with the increasing work and to further facilitate communication, new stations are to be erected by the Department at Newcastle-on-Tyne—to serve vessels plying in the North Sea—and at Valentia to pick up messages from the Atlantic. Further, the existing station at the Lizard is to be replaced by a new installation to be situated at the Land's End. What will perhaps make the figures in next year's report even more favourable than those in the present is the announcement that, with a view to encourage the use of the system, substantial reductions in charges are to be made in respect of messages from vessels engaged in the coasting trade and in the cross Channel services, the fee in the latter case being cut down to as little as twopence a word.

Safety at Sea.

From time to time figures are published showing how, on the whole, and in spite of occasional disasters, safety at sea is steadily increasing. I was looking over some of my old notes a few days ago, and I remarked what a fateful year 1878 was for the seaman. To name but a few of the disasters (and I could give many more) there was the capsizing of H.M.S. *Eurydice* early in the year, and then, in the holiday season when the weather is presumably good, such terrible disasters as the ramming of the *Grosser Kurfust* off Sandgate and the sinking of the *Princess Alice* in the Thames. The science of sub-division has progressed a good deal in the generation that has intervened, or, the *Hawke* being a much more formidable fighting unit than the old *Konig Wilhelm*, the *Olympic* might have fared a good deal worse than she did. But the losses of the *Grosser Kurfust* and the *Princess Alice* are not forgotten. My notes told me of a forgotten tragedy of even a more terrible kind. The year 1878 was one when there was acute trouble in the Near East and a British-built steamship of little over a thousand tons gross register took on board some three thousand Circassian refugees. She encountered a heavy gale and the first trouble was the shipping of a sea which swept some forty of the hapless passengers overboard. Four hours later fire broke out in the fore hatch, and to crown the trouble the vessel struck on a sandbank. The master gave orders to close the hatch to cope with the fire, with the result that no less than five hundred more refugees lost their lives. My note is taken from the "Times" of the year concerned. Much ink was spilled over the hardships endured by the Europeans who were hurried from Tripoli to Malta the other day, but, uncomfortable as they undoubtedly were, they came off better than these miserable Circassians.

The Isle of Man Steam Packet Company

has published statistics regarding the working of its recent season of 1911. It makes or mars its year in a period of 137 days—before and after that there is only the regular passenger traffic, as distinguished from that of the excursionists and tourists, to deal with. The Company served no fewer than thirty-seven ports and it has steamed 181,865 miles with its thirteen steamers, carrying altogether a total of a million passengers, a number which constitutes its record, being the biggest year's work of its long history. It is noteworthy that one of its vessels, *Ben My Chree*, has passenger accommodation for no fewer than 2714 persons. It would hardly seem that the recent labour troubles had effected any very considerable reduction of this Company's work.

NAVAL MATTERS—PAST AND PROSPECTIVE.

(*From our Own Correspondent.*)

Portsmouth Dockyard.

THE battleship *King George V.* was launched on October 9th by Princess Christian of Schleswig-Holstein, with whom was Princess Victoria of Schleswig-Holstein. On the conclusion of the religious ceremony the vessel was named by Her Royal Highness in the customary manner, and she then applied the chisel and mallet to sever the rope by which the weights were suspended, when the huge ship moved steadily into the water. A reception was afterwards held by Rear-Admiral and Mrs. Tate, when the Admiral presented Her Royal Highness with a water-colour drawing of the *King George V.* as she will be when completed. The mallet and chisel, enclosed in a carved oak casket, were presented to the Princess by Mr. Apsey, the manager of the Constructive Department. The vessel was berthed in Fountain Lake for the launching ways to be detached, after which she was removed to No. 5 Basin in readiness for being placed in No. 15 Dock. The battleship *Orion* has completed her gun trials, which, with the other tests imposed on her, are officially described as having resulted very satisfactorily. The vessel is now being prepared for commissioning. A report has been in circulation that during the gun-mounting trials the firing of the 13·5-inch guns weakened the supports of the guns of the secondary battery, but the report is understood to be without foundation. Our new battleship is not to be commenced until early in January, although £182,289 has been allowed for her up to the end of March. Only half that amount was expended on the *King George V.* in the first three months of her construction. The cruiser *Hawke* does

not appear to have been materially damaged by her collision with the *Olympic*. The plating outside a line drawn from the stem of the water-line to a point 10 ft. abaft the stemhead on the upper deck is broken and twisted over to starboard at an angle of 45 degrees. A new stem will therefore be required. The cruiser *Drake* has completed her refit and carried out her trials. She is now being prepared for commissioning as flagship on the Australian Station, where she relieves the *Powerful*. The battleship *Illustrious* has also completed her refit and has joined the Devonport Division of the Home Fleet. The destroyers *Ostrich* and *Fairy*, of the local flotilla, have been paid off for a refit. On October 10th the P. & O. liner *Medina* was commissioned by Captain Chatfield as flagship of Rear Admiral Sir Colin Keppel for the King's voyage to India. The same day there was an auction when the destroyer *Ardent*, now at Chatham, was sold for £1,300, and the storeship *Industry* for £1,100. The tug *Manly*, failing to realize the reserve price, was withdrawn. The cruiser *Lapwing*, which is on special service at this port is to be relieved by the cruiser *Sappho*, when she will be removed to the Motherbank and placed on the non-effective list. The new lock is approaching completion, and it is expected that the water will be let in before Christmas. There is still, however, a lot of work to be done, but it is anticipated that the work will be finished and the lock ready for use by the early part of next summer. The dry dock which is to run parallel with the lock is also making good progress, and it will probably be finished in about a year's time. A fatal accident occurred on September 29th. A steel cylinder charged with compressed air was being tested in the torpedo tube shop of the new factory when it exploded, two men being so badly injured that they died shortly afterwards, while seven other men were also injured. At the inquest it was stated that the cylinder was an old American make, the steel being thinner than a British made cylinder. A verdict of "Accidental death" was returned, the jury suggesting that American cylinders be discarded.

Devonport Dockyard.

The Admiralty have fixed Saturday, November 18th, as the date for the launch of the battleship *Centurion*, but at present it is not known who will perform the naming ceremony. The vessel was laid down on January 16th, and as she will be kept on the building slip for ten months, which is a month beyond the average for recent ships, she will be in a very forward condition when she takes the water. The armoured cruiser *Lion*, which is being completed at the North Yard, will not be commissioned probably until early in the New Year, instead of by the end of November as was anticipated. It appeared when writing last month as if the vessel was quite ready for her preliminary trials, and a captain was appointed to her on September 19th, but an unexpected delay has been caused owing to the port shafting having been found to be slightly out of line. Preparations are being made so that our new battleships can be laid down as soon as possible after the *Centurion* is launched. The drawings were received some weeks ago and it is understood that the vessel will be an improved *King George V*. The amount allowed in the Estimates to the end of March is £162,520, of which £17,170 is for labour. The new ship, which is one of the best in the world, will not, therefore, be allowed to remain vacant for five months, as in the year 1910-11. Two of the four vessels selected to form the cruiser escort for the King's voyage to India, the *Defence* and *Duke*, are having a general clean up and overhaul preparatory to their journey to the East. The battleship *Hindustan* has completed her annual refit and resumed duty as flagship of the rear-admiral of the Second Division of the Home Fleet. The battleship *Majestic* of the Fourth Division of the Home Fleet has also been completed. The cruiser *Lowestoft* is out of hand, after having undergone a refit costing over £4,000, and it is to be hoped that she will justify the large expenditure which has been incurred in making her efficient. Another large refit will be that of the cruiser *Sutlej* of the Fourth Division of the Home Fleet, for which £62,850 is allowed. The vessel is to be paid off on November 15th. The cruiser *Hibernia*, the depot ship for our local flotilla of destroyers, has had her armament strengthened by the addition of four 4-inch guns, her armament hitherto consisting of four 6-inch guns and four 12-pounders. It is understood that the depot ships *Blake* and *St. George* are to have their armaments similarly strengthened. The battleship *Royal Sovereign* is not to go to the Motherbank just yet. Both that vessel and her sister the *Royal Oak*, which will shortly pay off, are to remain at buoys in the Hamoaze until the Admiralty thinks it advisable to offer them for sale, there being naturally a limited market for such vessels, seeing that they are to be broken up in a certain time. The only vessel of the original eight of the class then remaining in commission at this port will be the *Empress of India*. Mr. M. P. Payne, assistant constructor in charge of the Constructive Manager's drawing office, has been appointed Admiralty overseer at the works of Messrs. Scott & Co., Greenock, to oversee the building of the battleship *Iron Duke*. He takes the place of Mr. J. Smith, who is leaving the Government service to take up an appointment with Messrs. White & Co., at Cowes.

Chatham Dockyard.

It has been announced that Lady Camden, the wife of the Lord-Lieutenant of Kent, will perform the naming ceremony at the launch of the cruiser *Chatham* on November 4th. It is a pity that the date clashes with that on which the mayors and corporations of Chatham, Rochester and Gillingham are chosen as civic representatives will be unable to be present. The work of placing the machinery in position is being carried out, but the greater part of the work will not be done until after the vessel is launched. The engines and machinery are being supplied by the Thames Ironworks Co. The battleship *Lord Nelson* has arrived for a refit, after which she will rejoin the Second Battle Squadron. The cruisers *Intrepid* and *Juno* have also come in for their annual refits. The *Natal*, of the Second Cruiser Squadron, is being prepared for escorting duties in connection with the King's visit to India. The *Shannon*, the flagship of the squadron, is to arrive for refit on November 4th. The cruiser *Blanche*, which is attached to the First Destroyer Flotilla, struck a rock on Pentland Skerries, between Orkney and Caithness, on October 3rd, but got off without assistance. She came here a week later for an examination of her hull and for her annual refit. It was found when the vessel was placed in dock that her stem was twisted and broken from the water line to the keel. A new stem will have to be fitted and several bent and damaged plates replaced. The *Musquito* and *Zulu* having completed their refits left on October 10th to rejoin the First Destroyer Flotilla, but the latter vessel had to return on account of a defect developing in one of her turbines. The *Tartar* and *Mohawk* of the same flotilla, have arrived for refit. The destroyers *Usk* and *Kennet* left on October 16th for the China and Mediterranean stations respectively. They call at Devonport, where they will be joined by the *Kibble*. On arrival at Malta the *Kennet* will relieve the *Welland* which will go to the Far East, where the *Usk*, *Welland* and *Kibble* are to relieve the *Hart*, *Jones* and *Handy* respectively. The China destroyer flotilla will be greatly improved by the substitution of vessels of the "river" class for the older destroyers. Submarine *D8* was launched on September 23rd, the naming ceremony being performed by the Hon. Lady Barker, wife of Major General Sir George Barker, commanding the Eastern Coast Defences. *D8* is the eighth submarine which has been built at this yard. *D7*, the first of the new type, has carried out her machinery trials off Sheerness very satisfactorily. She will be ready for service at an early date.

Sheerness Dockyard.

The Nore Destroyer Division is being completely reorganized, and at the same time greatly improved. With the approaching completion of the new ocean-going vessels of the *Acheron* class, steps are being taken by the Admiralty to replace the 30-knot vessels in the division by 30-knot vessels from other ports, the oldest of the relieved boats being placed on the sale list. The *Cygnet* has been paid off and her place taken by the *Cynthia* from Devonport, and instructions have been given for the former vessel to be removed to the dockyard but the *Seagull* will be paid off on October 30 and prepared for sale when relieved by the *Eagle* from Devonport. The *Lynx*, *Zebra* and *Hecate* will decide place on the sale list as they are relieved by the *Coquette*, *Cygnet* and *Lucifer*, which are now in the Fifth Destroyer Flotilla at Devonport. Another vessel to be prepared for sale is the *Janus*, which is to be relieved by the *Kennet* on the latter's return completing her refit at this yard. Torpedo boat No. 5[illegible]

of the Nore Destroyer Flotilla, which was recently damaged through striking a submerged rock off Inchkeith Island, has been paid off and placed in charge of a crew and maintenance party until her repairs are completed. Her sister boats Nos. 29 and 32 of the same flotilla have completed their refits and left for Dundee where the torpedo boats of the flotilla have been carrying out exercises, the destroyers being similarly engaged off the Orkneys. The *Dove*, of the Nore Destroyer Flotilla, arrived from Harwich on October 16th and was dry docked for the repair of damage to her bow which was bent over towards port and flattened near the water line. The *Dove* was damaged through another destroyer coming into collision with her. The vessels in hand undergoing refits are the sloop *Widgeon*, the destroyer *Wizard* and torpedo boat No. 82, of the Third Destroyer Flotilla, the destroyer *Rocket* and torpedo boat No. 111, of the Nore Destroyer Division, torpedo boats Nos. 18 and 115 tenders to the torpedo school ship *Actaeon*, and submarines C 2, C5 and C6 of Section 3 Submarine Flotilla. While the collier *Lancelot* which commenced coaling the ships of the Home Fleet in harbour on October 16th, was on passage from Cardiff to the Medway two explosions occurred in one of her holds but none of the crew were injured. The cause of the explosions is unknown.

Pembroke Dockyard.

The trials of the new cruiser *Active* were not postponed as it was at first anticipated would be the case. The basin trial took place on October 6th with satisfactory results, and about a week later the vessel left for Devonport, carrying out a thirty hours' trial on the way, other official trials taking place on succeeding days. After the *Active* returns the work on the hull and fittings, which is in a very forward state, will be completed, and the turbines and other machinery opened out for examination and reconnected. The twenty-four hours' acceptance trial will then take place, and the vessel will be commissioned about the end of December or early in January. The *Amphion* continues to make good progress. The navigating bridge has been lifted in and the rudder shipped, while the conning tower has also been placed in position. The conning tower and navigating bridge have not been put on board in the case of previous ships, while on the building slip, but it has probably been done in the case of *Amphion* so as to find work for the men engaged on her construction. The representatives of the Parsons Company, the contracting engineers, arrived towards the beginning of the month to make preparations for boring out for the propeller shafting and for putting in the under-water fittings. The work of boring should take much less time than in previous vessels, as there are to be only two shafts instead of four. The reduction is owing to the introduction of a new type of turbine, with which the *Amphion* will be the first vessel of the Royal Navy to be fitted. The new turbine combines the principles of the American Curtis and the British Parsons turbines. There is no further news as to the new cruiser which is to be laid down after the *Amphion* is launched, nor has the date of that ceremony been made known. The destroyers *Quail* and *Locust* are still in hand refitting. We have had a visit from Dr. Macnamara, M.P., the Parliamentary and Financial Secretary of the Admiralty, who received deputations in support of the annual petitions for the redress of grievances. The deputations represented workmen of practically every trade and class employed in the yard.

CORONATION DURBAR AND THE BRITISH MERCHANT SERVICE.—The Government of India is officially honouring the merchant service by issuing invitations to the principal steamship lines trading to India, *viz.*, the Peninsular and Oriental Steam Navigation Co., the British India Steam Navigation Co. and the Ellerman City Line, inviting them to send representative captains of their ships, accompanied by their wives, to attend the great Indian Durbar, to be held at Delhi. Captain Geo. Whish, M.S.G., commanding the Ellerman liner *City of London*, is one of the fortunate members of the Imperial Merchant Service Guild who will be present. Captain Whish served his apprenticeship in the City line, and with the exception of a short interval, has been in the employ of that Company during his professional career. Mrs. Whish will join her husband's ship at Karachi.

REFRIGERATING APPARATUS FOR MARINE TRANSPORT.

(*Continued from page 91.*)

RELATIVE EFFICIENCY OF DIRECT EXPANSION, BRINE COOLING AND AIR COOLING.

It will be easily understood from what has been stated before that the direct expansion system, in which the expansion coils are fixed directly in the chamber, or tank of water to be cooled, must be the most efficient. Next in efficiency come brine cooling, and next air cooling. The reason is as follows: Assuming a difference of temperature of 10°F., between the cooling agent and the substance cooled, when direct expansion is employed, the refrigerant has only to be allowed to assume a temperature 10° below that of the cold chamber, or of the produce, and the volume of the gas to be dealt with, either by the compressor or by the absorber and generator in the absorption system, increases as its temperature falls. With brine cooling, the brine has to be at a temperature 10° below that of the produce, and the gas in the expansion coils must be 10° below that of the brine or 20° below the temperature of the produce. Hence the volume of the gas to be dealt with will be larger, and the work done by the compressor or its equivalent in the absorption system will be proportionately larger. With air cooling the same thing rules. The air must be a certain number of degrees below the temperature of the produce, the brine must be a certain number of degrees below the temperature of the air, and the gas in the expansion coils must be a certain number of degrees below the temperature of the brine. As mentioned above, with care, it is possible to work to moderately close figures, closer than a difference of 10°F., but in making calculations it is wiser to allow for this difference.

Notwithstanding the greater efficiency of the direct expansion system, the brine cooling and air cooling are being more and more adopted, because of the greater convenience and the better results produced.

QUANTITIES USED WITH REFRIGERATING PLANT.

The quantities used with refrigerating plant will be a little puzzling at first sight. Firms who make refrigerating apparatus list them as ¼-ton, ½-ton, 1-ton, 2-ton plants, and so on. These figures do not mean the weight of the apparatus but their capacity for refrigeration, in terms of the equivalent capacity of a ton of ice. The English ton, or long ton, as it is sometimes termed, is 2240 lbs., the American ton, or short ton, as it is often termed, is 2000. Each lb. of ice in melting to the liquid form will absorb 142 B.Th. units, and therefore the short ton of ice will absorb 284,000 B.Th. units, and the long ton 318,080 B.Th. units. The refrigerating plant that is designed to do the work known as a ton of refrigeration, will perform the equivalent of the cooling effect of a ton of ice in twenty-four hours. That is to say, an American one-ton machine should abstract 284,000 B.Th. units from the surrounding objects in twenty-four hours, or 11,833 in one hour or 197 in one minute. The British one-ton refrigeration machine will abstract 318,080 B.Th. units in twenty-four hours, 13,253 in one hour, 220 in one minute.

There is not space in these articles to give the calculations necessary for the size of machine required for any particular work, but it may be mentioned that the calculation is not a difficult one. Every quarter of beef, for instance, required the abstraction of a certain number of B.Th. units to reduce it to freezing point, and a further number to freeze it. It of course requires the abstraction of a smaller number to reduce it to the chilling temperature. The same thing holds for other produce.

Also with a chamber of a given size, and with a given insulation, the rate of leakage through the insulating walls, floor and ceiling are known approximately. The number of heat units leaking into the chamber per minute or per hour can be calculated, and the quantity of cooled air that is necessary to be passed through the chamber to abstract the leakage heat, can also be calculated, and from it the quantity of brine and the quantity of the refrigerant that has to be handled. The result of the calculation should give the number of heat units that have to be handled per minute or per hour, and that rules the size of the plant that is required. The work to be done in cooling the produce when first shipped, if it has not been already cooled on shore, is usually the largest

part of the work, and [illegible] that a larger refrigerating plant shall be used than would be necessary to deal merely with the leaking heat.

ICE MAKING.

For board ship work, ice making will not be much in evidence, but it may be useful, and the writer believes it is practised in some of the great liners to manufacture a certain quantity of ice for table use. In the tropics it is very nice to have a lump of ice in each glass. Amongst other readers of *The Marine Engineer and Naval Architect* [illegible] supply of iced water at their meals. Iced water, that is to say, water at the temperature it would assume if a certain quantity of ice had been melted in it, can be made in the cold or refrigerating apparatus, without the aid of ice at all. There are apparata on the market in which water is cooled by the air of a portable plant, circulating, the water being enclosed in a tank provided for the purpose, from which it is pumped or drawn as required. Calcium chloride could be substituted for the usual brine, and would probably be preferable, as in the case of a leak of the gas it would have no unpleasant effect, while if the brine pipe leaked the effect upon the water would be distinctly unpleasant.

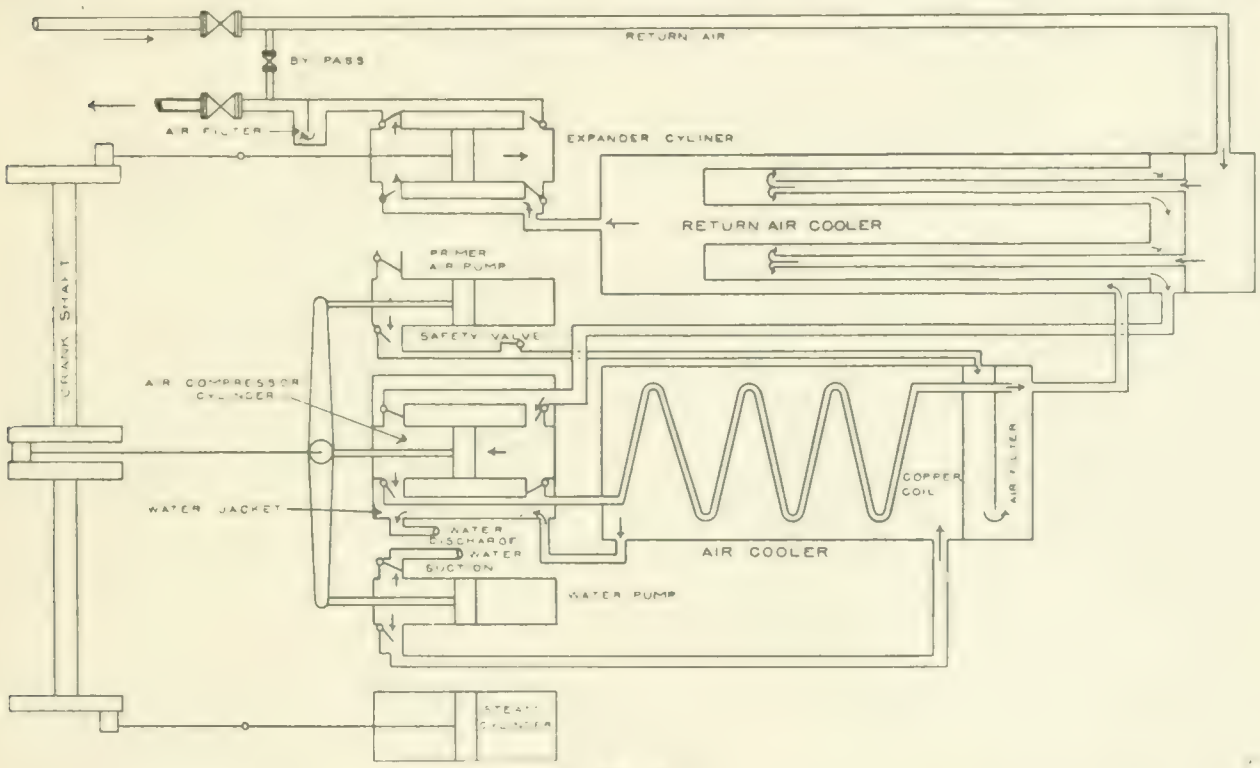


FIG. 2

On board, ice is usually made in large blocks or bars in plates and in cells. Probably the only method that would be employed on board ship would be the cell system. In the cell system, [illegible] cans of different sizes open at the top, the blocks varying from 1 cwt. up to [illegible] but slightly pyramidal in form, the lower ends being smaller in section than the upper ends. For making ice distilled water is employed, [illegible] where its purity is not in [illegible] advantages claimed for manufactured ice over natural ice is the fact that the purity of the water, and therefore of the ice, can be ensured. [illegible] germs of disease, which carry the contact [illegible] On ships, the usual method of making ice is in a large tank is formed open at the top, the upper and bottom [illegible] at the same pressure as [illegible] The cans are placed in the tank, each [illegible] tilled water nearly to the top, and the space around them is [illegible] circulating through the evaporator tank is explained in connection with the brine cooling system [illegible] convection currents, the expansion coils being placed in the tank itself. It is usual to provide some means to agitate the water in the cans in order to prevent the [illegible] seen.

For board ship work, the cans may be placed in any convenient position, [illegible] to the necessary low temperature. An [illegible] is that the heat should be extracted from the water in such a manner that the ice will freeze [illegible] in a horizontal position [illegible]

CAPACITY FOR ICE MAKING AND REFRIGERATION.

It is necessary to give a warning as to the capacity of the different plants, 1-ton, 2-ton, etc., when used to provide cold storage and when used to make ice. A 1-ton plant will not make one ton of ice in twenty-four hours. For calculation it is usual to take a 1-ton plant as being able to make half a ton of ice in twenty-four hours. The reason of this is as [illegible] when ice has to be made from water at ordinary temperatures, it has to be cooled from, say, 70°F., or usually a higher temperature when distilled water is employed, down to the freezing temperature and after the ice is formed its temperature has to be lowered some 15°F. or more, in order to make it stable. The latent heat of water as a liquid, the heat which 1 lb. of water at [illegible] is required to be abstracted from 1 lb. of water at [illegible] lb. of water, in reducing it to the freezing temperature, will

be higher. In addition to this, there is the loss by brine cooling, and sundry other losses, so that the practical rule has grown up of allowing to every refrigerating plant of a certain capacity half that amount as ice making capacity.

Cooling by Compressed Air.

One other matter remains to be mentioned, *viz.*, the method of cooling by the aid of compressed air. It was used to a considerable extent in the early days of refrigeration apparatus, particularly on board ship, on account of its great simplicity, and the fact that no refrigerant, no foreign agent, such as ammonia or carbonic acid, was required. In compressed-air refrigerating apparatus the property is made use of with which marine engineers will be familiar, that when air is compressed it is heated, and if the heat is abstracted from the compressed air and the air is subsequently allowed to expand, in expanding it will extract the heat necessary for its expansion from surrounding bodies, and will in the process be cooled to a very considerable extent itself. It will be seen that providing the arrangement can be properly carried out, a compressed-air system furnishes the cold dry air, at first hand, that is furnished by the elaborate systems that have been described above. The reason why the compressed air system is gradually being disused is because of the higher efficiency, the lower running costs, all things being taken into consideration, of the systems in which one of the refrigerants mentioned is employed. With small apparatus the compressed-air system is good on account of its simplicity and the increased cost does not matter. With large apparatus, however, such as are necessary for the large cargoes of meat and other produce that are now carried, the question of the power employed and the running costs generally are of importance.

The Compressed-Air Apparatus.

There are several forms of apparatus in which compressed air is used for refrigerating purposes, but they all run on the same main lines. In all of them there is a compressor, similar to the compressor of an ammonia or carbonic acid apparatus, but using only air. The compressor is of comparatively small size, and is double acting. Air is drawn in at each stroke through the suction port, and during each stroke is being compressed to a certain pressure and driven out through the delivery port when the pressure reaches a certain figure. After compression the air is cooled and dried. There are various apparatus for cooling and drying the air, but again all are on the same main lines. In all of them water is employed, which is sometimes broken up into very small quantities, as by trickling over the surfaces of different objects designed for the purpose, and in those apparatus the air is made to pass over the wetted surfaces of the objects. In others, the air is cooled by circulating water. Air, it will be remembered, has a certain capacity for absorbing moisture, which increases with its temperature. The hot air therefore coming from the compressor will first absorb a certain quantity of the moisture on the wetted objects it meets, and in so doing it will be itself cooled. In order that the water present shall evaporate, it must absorb a certain amount of heat, and this is largely taken from the air which absorbs it. As the air passes on it is cooled more and more, and being cooled, loses its capacity for holding moisture, the moisture which it brought over from the compressor and that which it has taken up from the cooling apparatus, being deposited upon other parts of the cooling objects, the air then passing on in a comparatively dry state. If the apparatus is well designed, the air should be quite dry when it issues from the cooling apparatus. After passing through the cooler, the air enters a second cylinder, in which there is another piston, the connecting rod of which has its crank upon the same shaft as that of the compressor, the two being at right angles to each other. In the expansion cylinder the air is allowed to expand, doing work upon the piston, which thereby assists the work of compression in the compression cylinder. The expansion cylinder is very much larger in diameter than the compression cylinder. In expanding the air has its temperature very much lowered. It is claimed by the makers of some compressed-air apparatus that the air issues from the expansion cylinder at a temperature of minus 100°F. The air passes from the expansion cylinder, through a duct into the chamber to be cooled, and the warmed air, which has done its work in cooling the air of the chamber, and the produce held in the chamber, is sucked back to the compressor through another duct, usually in the upper part of the chamber. There is a continual circulation of the air from the chamber to the compressor, thence to the cooler, thence to the expansion cylinder, thence to the chamber, and so on.

A certain amount of water is lost by evaporation in the wet forms of cooler, and is made up from an independent supply. It is important also that the expansion cylinder at any rate should be very close to the chamber to be cooled, as the loss by leakage in the duct, with the air at the very low temperature it is made to assume, is considerable. That is to say, the leakage of heat through the walls of the duct, into the air that is passing to the cold chamber, is very considerable, and if the duct is long the efficiency of the machine is very considerably reduced. Fig. 15 is a diagram of an American form of compressed air cooling apparatus.

NOTES ON AN EXTRACT FROM A REFRIGERATOR LOG BOOK.*

By Mr. Wm. Sinclair, M.I. MAR. E.

Date.	Time.	Temp. Sea Water.	Condens. Press.	Refrig. Press.	Temp. Brine.	No. 1 Hold.	No. 2 Hold.	Revs.	Remarks.
Aug.	p.m.								
15	2			58	60	60	60		Started machine 2 p.m.
	4			42	40	54	52		
	5			38	34	42	40		
	7			33	27	34	32		
	10			26	25	—	—		
	12			26	22	—			
	a.m								
16	2			22	20	—	—		
	6			12	20	24	23		
	9			8	20	—	—		
	12			4	20	—	—		Stopped machine, overhauled valves, put in calcium chloride in refrigerator to increase the density
	p.m.								
	3	62° Constantly.	150 Constantly	36	30	26	26	120 Constantly.	
	6			22	17	22	23		
	7			20	15	—	—		
	8			16	11	20	20		
	10			14	7	16	18		
	11			13	6	13	14		
	a.m.								
17	1			—	—	10	11		
	4			10	4	9	10		Started loading meat 8 a.m.
	8			10	4	8	8		

The above is a portion of the log of a marine refrigerating plant, consisting of an ammonia compound Linde compressor and a brine refrigerator working on Nos. 1 and 2 insulated hold space, the size of compressors being $\frac{6'' \text{ \& } 10''}{10''}$

In order to lead up to the remarks in this short paper and to help in understanding the working of ammonia with brine refrigerating machinery, a few points will be briefly touched on.

The refrigerating medium, ammonia gas, in a saturated condition (that is, saturated in the same manner as steam is understood to be) has constant properties, so that given the pressure the temperature is obtainable along with its latent heat of vaporization, relative volume, etc. When ammonia liquid vaporizes, the latent heat necessary for the production of the vapour must come from an outside source or the liquid will freeze itself and evaporation will cease,

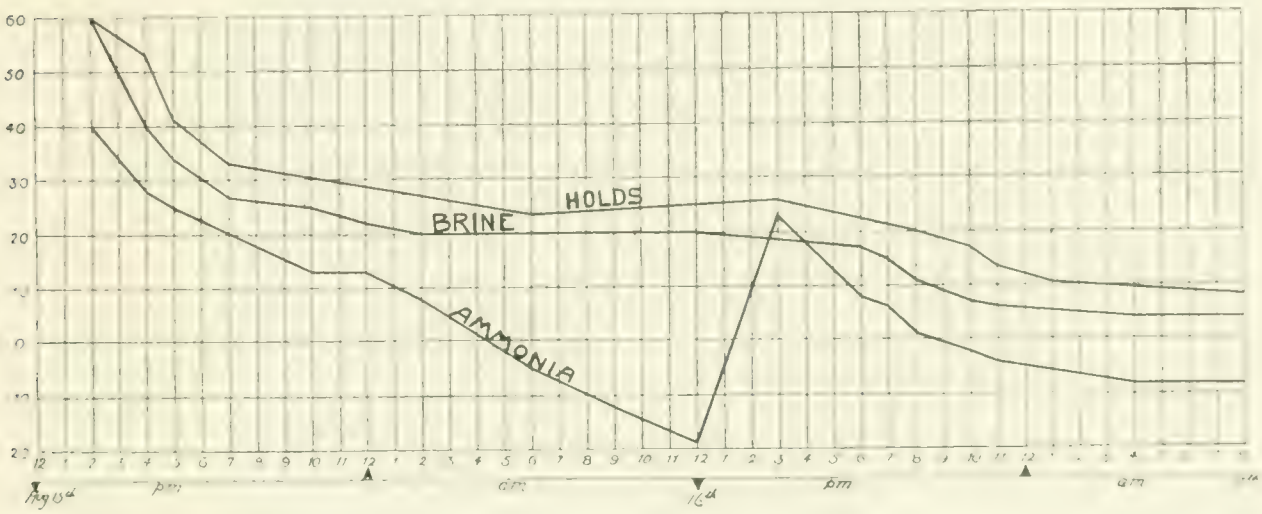
* Read before the Institute of Marine Engineers.

so that if the evaporating ammonia is surrounded by an uncongealable liquid, heat will be abstracted from this liquid, and if this evaporated gas is compressed and simultaneously cooled the gas will be condensed into liquid form and be again ready for evaporating. A refrigerating plant on the brine system, then, consists simply of an evaporator, a condenser and a pump for drawing the evaporated gas from the evaporator and compressing it into the condenser: the uncongealable liquid (brine) surrounding the evaporator pipes is pumped through pipes in the chambers, picks up heat and returns to the evaporator.

There are, as will be seen, three principal transfers of heat: (1) from the hold to the brine, (2) from the brine to the ammonia, and (3) from the ammonia to the condensing water, and unless there is between these various steps a difference of temperature level, heat will not flow from the one to the other; for instance, if the hold temperature were 40° and the brine in the pipes in the hold also 40°, no flow of heat could take place from the hold to the brine; the brine would require to be nearer 30° to do useful work.

[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	53
[illegible]	[illegible]	[illegible]
20	[illegible]	[illegible]
[illegible]	[illegible]	
13	22	
8	20	
[illegible]	[illegible]	[illegible]
−12	[illegible]	[illegible]
[illegible]	20	[illegible]
[illegible]	30	[illegible]
8	[illegible]	[illegible]
6	[illegible]	
1	11	20
−2	7	17
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
−8	4	[illegible]
[illegible]	4	[illegible]

This at once opens up a new view of the log, and in order to make the matter plain the various times



Keeping these notes in view the log can now be examined. It is an ordinary everyday log, and we usually glance only at the final results, that is, the hold temperatures, for, to speak practically, the other columns as they are here written are meaningless. Temperature of brine and temperature of gas in refrigerator coils should bear a known relation the one to the other, but here are temperature of brine and *pressure* of refrigerator standing side by side, and we cannot compare them. Temperature of hold and temperature of brine, however, can be compared, and, looking at these two, it would appear that the temperatures came down smartly, hung for some hours at 20°, and, after an upward movement, fell steadily; more than that we cannot state with any degree of certainty.

But suppose we turn up a table of properties of saturated ammonia and mark down against each refrigerator pressure its corresponding temperature, we then get with the average hold readings three columns of temperature, thus:—

and temperatures are shown in the form of a diagram.

On referring to these figures and the diagram it will be noticed that there is on an average [illegible] difference between the hold temperature and the brine temperature. Between the brine and the ammonia, however, the difference varies more widely. Nor must the log be brought under severe censure for this. As stated earlier in the paper, pressure and temperature are in constant relation and can be governed by the person running the refrigerating plant. One valve does it all, known as the regulating valve. It is the only valve that can be varied in a refrigerating plant during the working cycle, and it is the key to the whole system. Now if this valve be opened so that the evaporating *temperature* in the refrigerator coils is 12° to 15° lower than the temperature of the brine, then the machine is doing its best work, and as the temperature in the brine tank falls, so the engineer running the plant must handle the regulating valve to give the necessary result of difference in temperature level.

In the running of an ammonia compressor of this type there is a practical rule that most engineers work to, *viz.*, that if the delivery pipe to the condenser is just warm enough to prevent the hand remaining on it, then (assuming all mechanical details are right) the plant is working as it should. The explanation of this rule is this: Suppose the regulating valve to be open far enough to pass more liquid ammonia into the evaporator than is actually needed to refrigerate the brine, then the ammonia gas is drawn into the compressor still possessing some of its property of absorbing heat, and during the compression process the curve will approximate to the isothermal line by reason of the heat of compression being taken up by this gas. All saturated gas machines are designed so as to take some advantage of this, and it has been found that when the gas comes back to the compressor at such a temperature, on being discharged at condenser pressure its heat is as stated above, then that plant is being worked as it was designed to be. If the delivery pipe is too cold the regulator is to be shut in; on the other hand, if too hot, it is to be opened out.

This plant was being handled along these lines, and on referring to the figures it will be noted that at 6 a.m. on the 16th the brine temperature stood at 20° and the ammonia at 8°, six hours later the brine still stood at 20°, but the ammonia had fallen to—19°, and still on the "hand feel" test the plant was working well and the regulating valve was being gradually closed down. Obviously, then, the ammonia gas was being drawn into the compressor without evaporating to the degree it should have done, for the brine was not availing itself of the ability of the ammonia gas to absorb heat during its evaporation; the brine could not, therefore, be coming in contact with the pipes in the evaporator where the ammonia was expanding, and as the evaporator was full of brine the inference was that the brine was freezing on the evaporator pipes, and so covering them with ice which would act as an insulator.

The brine was about 1,200 specific gravity and the freezing point of this brine is −12°, which as it was not intended to come any lower than about 3° would seem to be ample margin, but with slow circulation in the refrigerator and having in mind the necessary low ammonia temperatures to reach 3° brine temperature, 1,200 brine was not dense enough.

A start was accordingly made increasing the brine density. This caused the rapid rise in temperatures shown, which is most apparent on the ammonia figures. Then the increasing efficient working of the machine becomes apparent, as it will be noted that all three lines commence to fall in proper ratio until the working limit of the plant of the insulated capacity is reached, shown by the gradual flattening out of the curves.

To explain this latter point about the working limit more fully, take the machinery as running at 3 p.m. on the 16th—

Ammonia gas suction temperature ..	23°
,, ,, pressure	36 lb.
Brine temperature	30°
Sea temperature	62°

Tables of saturated ammonia give us at this gauge reading—

Heat of vaporization ..	541·28 B.T.U. per lb
Volume of vapour in lbs per cub. ft.	5·488 B.T.U. per lb.

As the liquid ammonia leaving the condenser will be about the temperature of the sea water, *viz.*, 62°, and the brine is at 30°, 32° is taken cooling the liquid ammonia itself before any outside work is done.

541·28
32·00

509·28 = nett refrigerating value of the liquid.

The low-pressure compressor or gathering cylinder is 10 in. diameter × 10 in. stroke single acting at 120 r.p.m.

Volume swept by piston per hour in cub. ft. =

$$\frac{78{\cdot}54 \times 10 \times 120 \times 60}{1728}$$

and the B.T.U. per hour

$$\frac{78{\cdot}54 \times 10 \times 120 \times 60}{1728} \times \frac{509{\cdot}28}{5{\cdot}488}$$

As refrigerating machinery is rated in tons ice melted per 24 hours, and a ton ice melted = 142 × 2240 = 318080 B.T.U., the machine would be theoretically rated as follows:—

$$\frac{78{\cdot}54 \times 10 \times 120 \times 60}{1728} \times \frac{509{\cdot}28}{5{\cdot}488} \times \frac{24}{318080} = 23 \text{ tons.}$$

But take the final reading at 8 a.m. on 17th:—

The gauge reading is 10 lbs. suction gauge.

Brine temperature, 4°.

The heat of vaporization of the ammonia is 560·39 and volume 10·860, sea water 62 − 62 − 4 = 58°.

560·39
58

502·39 nett B.T.U. per lb.

Machine refrigerating capacity—

$$\frac{78{\cdot}54 \times 10 \times 120 \times 60}{1728} \times \frac{502{\cdot}39}{10{\cdot}860} \times \frac{24}{318080} = 11{\cdot}6 \text{ tons.}$$

At this point the B.T.U. extracted by the machine about equals the B.T.U. leaking through hold insulation, and to further reduce the suction temperature would mean that not sufficient weight of ammonia gas was being circulated in the evaporator coils; the working limit of the machinery on this capacity is therefore reached.

From the above notes it will be apparent that a log for a refrigerator should be carefully taken and as carefully analysed, and in many instances the source of any inefficiency in a machine can be discovered at a glance by setting out in a diagram form the different temperatures.

It must not, however, be expected that the curves should show absolutely symmetrical lines, and to find this on a plant, unless it was an exceptionally well-regulated plant, would give rise to suspicion, for very few, if any, of even well-run plants, will make a first-class showing on this method.

Were the machine to be one working on the direct expansion method, the intermediate step of heat transfer from the room to the brine would be omitted, and the heat picked up direct by the expanding ammonia, but in this latter case there would require to be at least the same difference in temperature in one stage as there was in the brine plant in two stages. Air is not so good a conductor of heat as brine, and unless there is this great difference in temperature level the heat will not flow.

INSTITUTION OF ENGINEERS AND SHIPBUILDERS IN SCOTLAND.

Presidential Address.

PRESENT-DAY MARINE ENGINEERING PRACTICE AND ITS DEVELOPMENTS.

E. Hall-Brown, Esq., President.

At the first general meeting of the fifty-fifth session of the Institution of Engineers and Shipbuilders in Scotland which was held in the Rankine Hall of the Institution on Tuesday, 24th October, there was a very large attendance, and after some routine business the new president, Mr. Ebenezer Hall-Brown, whose portrait we are here enabled to give, delivered his presidential address. Its subject was entirely concerned with marine engineering from the point of view of present-day practice and of estimating at their proper value the various proposals at present being made to alter that practice with the object of attaining greater efficiency and economy. Further than referring shortly to one or two points having direct bearing upon present-day practice, the address did not deal with the history of marine engineering.

From the time the president departed of the introduction of the triple compound engine till the introduction of the marine steam turbine no outstanding innovation had been

proposed in marine engineering. The period had not, however, been one of stagnation but rather of consolidation after an important advance. Improvements in detail had been made from time to time and the aggregate result was a distinct improvement in economy of fuel as compared with the earliest examples of the triple compound engines. The introduction of quadruple compound engines and their adoption by some shipowners does not radically affect the correctness of this statement; the development from triple to quadruple, accompanied with an increase in the working pressure being simply a further movement along the lines laid down when the first compound engine was designed. Once the principle of multi-stage expansion had been adopted, and proved to be attended with economy it was simply a question of degree whether the full expansion of the steam should take place in two, three or more stages. Similarly as soon as it was proved economical to use steam of 80 lbs. pressure rather than steam of 30 lbs. pressure it became a question of practical workmanship rather than of any theoretical consideration what working pressure should be used.

For a considerable time practical considerations relative to the construction of boilers of large size limited the working pressure which could be used commercially. These difficulties have now practically vanished, and boilers can be constructed suitable for any working pressure it is desired to use. The gain to be obtained from increased pressure is, however, a diminishing quantity even when measured solely by the amount of heat required per unit of work. When the increased cost of engines and boilers for higher pressures is also taken into account, it becomes apparent that with the present type of reciprocating engines no great advance in boiler pressure is probable over that at present in everyday use. While steam pressures up to 300 lbs. have been used it is probable that, viewed from a commercial standpoint, equally economical results could be attained with lower pressures.

The introduction of the marine steam turbine, which will be associated for all time with the name of the Hon. Sir Charles Parsons, did not in its earlier stages seriously affect the supremacy of the reciprocating engine. This state of affairs has, however, gradually changed during the last ten years, and although at the present time it is not clear that the balance as regards fuel economy inclines more to one type than to the other, there are directions in which the turbine is undoubtedly supreme. This is especially the case in vessels of the largest size and speed. The recent successful application of speed-reducing gear to the steamer *Vespasian* has further widened the field of application of the steam turbine, and rendered its adoption for vessels of moderate speed possible.

It would seem as if marine engineers did not yet quite realize to what an extent the successful application of the steam turbine has revolutionized, and will still further revolutionize, marine engineering. The stupendous fact that a novel invention, entirely discarding the traditions of marine engineering, has proved such an enormous success has entirely changed the mental attitude of marine engineers and of those responsible for the building of sea-going vessels of all kinds, and has engendered a much more sympathetic attitude towards proposed developments in various directions. It is to this change in the mental outlook that I attribute the present enthusiasm for new developments, however bold and untried, and while success may not crown every effort, I look forward to an enormous advance in marine engineering practice as a result of the present activity.

The attention which the internal combustion engine, especially of the Diesel type, is at present receiving from marine engineers reminds one of the period from 1881 to 1886, or thereby, when the subject of radial valve gears was very prominent, and as there are valuable lessons to be learned from the experience of that time, I may be pardoned for referring to it at some length. It had always been known that the steam distribution given by ordinary Stephenson link motion was very imperfect, but the directions and simplicity of the gear, and the fact that it was thoroughly understood and easily adjusted by any ordinary engineer, were, and are, strong points in its favour. At the period to which I refer it seems to have dawned suddenly upon the marine engineering world that a valve-gear giving a more equal distribution of steam to the outgoing and incoming strokes of the piston would be productive of economy, and as a result there was an enormous production of "radial valve-gear" designs of all sorts and kinds. To mention a few of the designs produced I may recall the names of Hackworth, Joy, Kirk, Bryce-Douglas, Brock, Bremme, Wyllie, Morton and many others. These gears generally gave a much more uniform distribution of steam than the Stephenson link and it is probable that their adoption in some cases was assisted by the fact that generally they permitted of the valves being placed at the front or back of the cylinders, and so reduced the overall length of the engines. Unfortunately for the various inventions it was not found that the better distribution of steam led to any measurable degree of economy, while the gears generally cost more to manufacture and were more expensive to keep up than the older gear. It was also found that they were thrown more out of adjustment by the inevitable wear-and-tear than the ordinary gear, and were more difficult to readjust. As a result, radial gears, after the first period of enthusiasm fell into gradual disuse, and so far as I am aware, none of them are being manufactured to-day for marine purposes.

After this period of somewhat ineffectual activity it would seem that marine engineering developed very slowly along the traditional lines of improvement, and owners and engineers alike seemed disposed to consider the type of engine definitely fixed, and any divergence from the standard type was generally subjected to very adverse criticisms, and met with a hostile reception. It is, however, being gradually recognised that the time has come for a further advance, and new proposals are to-day receiving more favourable consideration than ever they have hitherto done. Many causes have contributed to this result, but as it is said that "nothing succeeds like success," I believe the success of the steam turbine has contributed more to this change in the mental outlook of marine engineers than any other single cause. In the long run nothing but good can come of the endeavours now being made to improve the economy of the marine engine. To attain this result with a minimum expenditure, it is necessary that each possible line of advance should be carefully studied, and its advantages and disadvantages accurately estimated.

As a starting point for such an investigation let us take an ordinary triple-compound engine working with saturated steam of 180 lbs. boiler pressure, the steam being generated in ordinary return-tube boilers of the Scotch type. The first point to be noted is that the engine exists for the purpose of driving the ship, and its performance is to be measured, not by the amount of fuel required for the production of a unit of power at the engine, but by the amount of fuel required per unit of power expended upon the actual propulsion of the ship. This implies that to obtain the highest results the conditions must be such as correspond with maximum propeller efficiency, and consequently the speed of revolution should be fixed by the propeller and not by the engine. With a reciprocating engine this is quite a simple matter, but with a direct-coupled steam turbine it has always been necessary to make a compromise with a corresponding loss of efficiency both at the turbine and at the propeller.

Although a screw propeller is a fairly elastic instrument as regards the proportions corresponding to maximum efficiency, it should be recognised that any great departure from standard practice as regards either diameter or pitch is likely to be followed by a substantial loss. In the case of an ordinary cargo vessel of full form, for instance, to either reduce the diameter of the propeller or to reduce the pitch so as to allow of increased speed of revolution, will invariably reduce the efficiency of the propeller. The importance of this point is now being recognised both for cargo vessels and for vessels of finer form and higher speed, and speed-reducing gear is being applied both to cargo vessels and high-speed torpedo-craft. In a paper which I read before the North-East Coast Institution of Engineers and Shipbuilders in January, 1890, I advocated high-speed engines for cargo vessels, the engines being connected to the propeller shafting by means of gear-wheels, so as to reduce the speed of the engine to that of the propeller. I do not know that there were facilities at that time for such a gear, but in any case the proposal was never carried into effect, and the first application of such a reducing gear of any considerable size is that in the s.s. *Vespasian*. This subject

of geared reciprocating engines will be reverted to later on. Meantime my object is to point out that it is now fully recognised that the proportions and speeds of revolution of propellers in ordinary practice are such as correspond generally to a high efficiency, and that any great divergence from this practice will result in diminished efficiency.

It is therefore evident that in considering the value of an engine for screw propulsion account must be taken of the speed at which it must be run to obtain maximum efficiency, and if that be different from that corresponding to maximum propeller efficiency, arrangements must be made by gearing or by other transmission systems to suit the differing speeds, or allowance must be made for loss of efficiency at the propeller before comparing with other prime movers working at speeds suitable for the propeller. The speed of a steam turbine is always too high for the screw propeller, and it is in this connection that the demand for a speed reducing gear first became acute. There are at least three principal systems proposed. That of machine-cut toothed gears as fitted to the *Lusitania*, electric transmission from a dynamo driven by the steam turbine to an electric motor on the propeller shafting, and the hydraulic system associated with the name of Fottinger. Each system has merits of its own, and time alone can show which will secure most general adoption. The high efficiency of accurately-cut tooth gears, and the success which has attended the installation in the *Lusitania* will have the tendency to incline mechanical engineers to favour that system.

Although the steam turbine is the most extreme case of divergence from the speed at which a screw propeller ought to run, it is evident that some of the proposals now taking form for fitting internal-combustion engines to ships will suffer from the same cause, and in estimating the results to be obtained from the use of these internal-combustion engines, this is a point which must be allowed for. It may be that this will be rectified in future either by introducing reducing gear or by designing the engines for lower speeds. However that may be, it is evident from the few particulars already published of sea-going vessels driven by means of oil engines that the speed attained is considerably less than would result from the use of reciprocating steam engines developing the same amount of power.

Returning now to the triple-compound engine working at 180 lbs. pressure, which I proposed to use as a basis of comparison. A well-constructed engine of this class will have a mechanical efficiency of 94 to 95 per cent. when driving its own air circulating and feed pumps. The speed of revolution can be settled by the requirements of the propeller entirely, and the engine designed to suit the speed, so that the maximum propeller efficiency can be attained. Such an engine will require 13½ lbs. steam per I.H.P. per hour equivalent, with ordinary good coal, burned in the furnaces of a Scotch boiler having an efficiency of 70 per cent., to a consumption of 1·5 lbs. per I.H.P. per hour. This engine may be considered the development of the conservative policy of the last twenty years, and cannot be said to differ in any material point from the first triple-compound engine produced. Built, as it usually is, with three cylinders and three cranks placed at angles of 120 deg. to each other, such an engine gives a fairly uniform turning moment which is greatly in favour of propeller efficiency, and the loads upon the various parts are moderate in relation to the working pressure. It is therefore a really cheap engine to build and to keep in repair. An additional advantage, and one of great importance, is that the management of such an engine presents no difficulties to the average sea-going engineer. With coal at 12s. per ton, which is the price of good steam coal trimmed on board in Glasgow Harbour, a triple-compound engine will give 10 horse power for one pennyworth of fuel.

While the design of the triple-compound engine is to-day practically what it was twenty years ago, it must not be supposed that no attempts have been made to attain greater economy in the use of fuel. Although the use of saturated steam is still almost universal in British-owned vessels, there is every indication that at no distant date the advantages of superheated steam will shortly find their adoption. Which the economy to be obtained by the use of superheated steam has always been admitted, the practical difficulties which caused its use to be abandoned many years ago tended to make marine engineers exceedingly cautious with regard to its re-adoption. Fortunately these difficulties have now been entirely overcome, and there is little doubt that superheat can now be generally used and used as safely as saturated steam, and that without any great alterations in the design of the engine. The amount of saving which may be obtained by the use of superheated steam is very considerable, and may amount to 20 or 25 per cent. of the coal consumption with a superheat of 150 deg. to 250 deg. Fah. In Schmidt's design as usually fitted to retort-tube boilers the superheater tubes, which are of small diameter, are placed within the outlet of the tubes of the boiler, no alteration being required in the design of the boiler, while the alteration between the boiler and the engine are simply the use of steel stop valves for the superheated steam, together with steel or iron pipes for the main superheated steam pipes, and a special design of piston valve rings with a steel piston valve body for the H.P. cylinder, and metallic packing for the H.P. piston rod. There are many other superheating systems on the market, each doubtless having advantages of its own. I only mention the one which I know to have been extensively and successfully applied to marine work. The point which I wish to make clear is that without any great alteration superheated steam may be safely used in an ordinary triple-compound engine, and very considerable economy result from its use. Doubtless still greater economy will be attained if the engines are specially designed for the use of superheated steam.

An interesting attempt to attain a high degree of fuel economy by the use of extremely high working pressure in conjunction with superheating and multi-stage feed water heating is to be found in the five-crank engines of the *Inchmarea* and *Inchmarlo*, built at the Central Marine Engine Works, West Hartlepool. Having decided to use a working pressure of 300 lbs. per sq. in., it was considered that expansion should take place in more than three stages. The objection to four stages and four cylinders was that with four cranks at equal angles there were only four impulses per revolution, while an ordinary triple-compound engine gave six impulses per revolution. It was therefore decided to use five cranks, and so obtain ten impulses per revolution. The resulting turning moment is extremely uniform, and should result in a high propeller efficiency. The superheaters were placed in the uptakes, and were entirely heated by the waste heat escaping to the funnel. Personally, however, I should not expect a high degree of superheat to be attained in this manner. Probably as superheated steam was only then coming into use under modern conditions, it was not considered desirable to aim at too high a degree of temperature. Steam for the multi-stage feed heater was taken from the receivers and from the boilers direct, so that the feed water entered the boiler at practically the temperature of the steam. There were many other points of interest in connection with these remarkable engines which will well repay study. Although I have not been able to obtain data of any scientific trial of the machinery of either of these ships, I have been assured that in actual service the consumption of coal did not exceed 1 lb. per I.H.P. per hour. That the arrangement of machinery in the two vessels referred to was a costly one must be self-evident, and it is probable that further adoption of the system in its fullest development has been prevented by the first cost of the installation. The question of cost is one which the engineer is apt to neglect or at least to give insufficient attention to; it is, nevertheless, a matter of vital importance, especially in marine engineering where the items of depreciation and insurance are extremely heavy, and a small capital expenditure is a very great advantage. The great importance which Mr. Mudd, the designer of the five-crank engines, attached to uniformity of turning moment, reminds one that this is a point affecting propeller efficiency which is frequently overlooked. A screw propeller will only work at maximum efficiency when revolving uniformly, and any lack of uniformity in turning moment produces a very sensible limitation in efficiency. I am unfortunately unable to give any figures regarding this. It is a point upon which there have been very few experiments, but it is one well worthy of careful attention in view of the proposals for the extensive use of internal-combustion engines, which, owing to their very heavy impulses, are apt to be very irregular in angular velocity.

(*To be continued.*)

MARINE BOILER EXPLOSIONS.

REPORT No. 2049 deals with the explosion from the main boiler of the s.s. *Madge Ballantyne*. The explosion occurred on the 8th March last when the vessel was about 3 miles from the harbour entrance, Arbroath. No person was injured by the explosion. The boiler is made of steel, and is of the ordinary cylindrical, multitubular, single-ended marine type. It is fitted with three furnaces of the "Morrison" section, with coned ends, and separate combustion chambers. A circumferential crack about 6 in. in length developed at the bottom of the coned neck at the combustion chamber end of the port furnace, through which water from the boiler was blown out into the stokehold. The explosion appears to have been caused by a latent defect developing into an open crack, owing to the expansion and contraction of the furnace under working conditions. The observations of the Engineer Surveyor in Chief are as follows: This report deals with the failure of a sectional cone-necked furnace. The explosion was not of a violent nature, though as a result the vessel was disabled, the pumps being unable to maintain the level of the water in the boiler, due to the rapid leakage. The furnace cracked at the cone neck, due, it is thought, to the development of a latent defect which was caused by the boiler having been strained when it was submerged under full steam pressure on a previous date.

Report No. 2059 deals with the explosion from a boiler on board the steam trawler *Loch Maree*. The explosion occurred on the 5th June last. No person was injured by the explosion. The boiler is made of steel, and is of the ordinary single-ended marine type, with three furnaces and separate combustion chambers. A hole about $\frac{5}{16}$-in. in diameter was formed in one of the plain tubes in the starboard wing of the boiler through which the water and steam escaped into the stokehold. The cause of the explosion appears to have been that the tube was chafed through by the movement of an internal feed pipe, which had become loose and rubbed against it. The observations of the Engineer Surveyor-in-Chief are as follows:—This report deals with the failure of a smoke tube in the boiler of a fishing vessel. A small hole was formed in the tube by the chafing action of a loose internal feed-pipe. The explosion was of a minor character; but those in charge of the engine-room were unable to effect repairs, and the vessel was towed into port. No person was injured. I have to add, however, that it is a dangerous expedient to try to stop a defective tube by wooden plugs at the ends, owing to the high pressure tending to force them out. Fatal accidents have resulted through the adoption of this improper method of repair. In this case one of the plugs was blown out, but struck the smoke-box door.

THE NAVAL AIRSHIP.

DURING October a commission of enquiry into the causes of the disaster to the naval airship at Barrow was held on board *H.M.S. Hermione*, lying in Ramsden Dock alongside the broken vessel. Evidence was here taken, not only from the men who built and the handymen who helped to launch, but from aeronautical, naval and engineering experts whose opinions are considered of value. The enquiry lasted six days, and the commission has since its termination been busy in drafting a report which will be submitted to the Admiralty prior to any decision being come to, either as regards making good the damage done or determining whether or not to build another airship on designs which experience and science suggest as a better flying machine than any yet designed or built. The opinion of those who have had experience with airship No. 1 is that it would be much better to build a new vessel than patch up the wrecked vessel. They base their suggestions on knowledge gained in the building of the first ship, and on certain imperfections in her design which have been discovered during the process of her construction.

THE SUBMERSIBLE ELECTRIC MOTOR.

ONE of the difficulties in reference to the working of electric motors in the past has been the risk of failure when employed in wet or even damp places. For many years past great efforts have been made to overcome these difficulties by enclosing the motor in different kinds of casings, so as to make them perfectly water-tight and air-tight, but success has not crowned these attempts in every case, as the heat generated has set up conditions involving condensation, and the insulation of the armature has broken down.

Submersible Motors, Ltd., of 23, St. Swithin's Lane, have put on the market a motor, which, although quite open, can be submerged in water, and will work perfectly without any serious practical risk of failure.

The solution of the problem appears to reside in the fact that instead of trying to keep the water out,

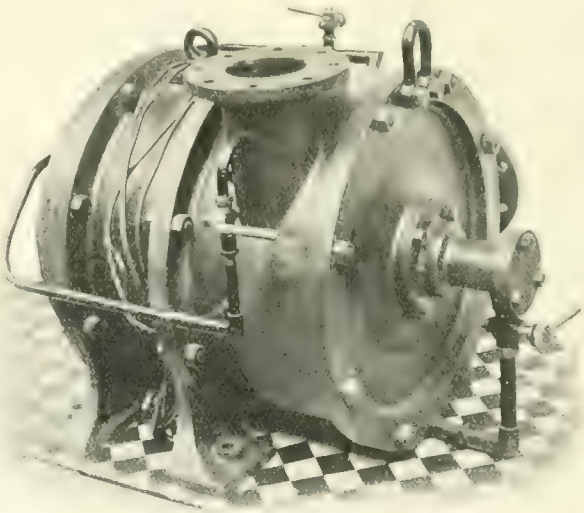


Fig. 1. Admiralty Type.

water is allowed free access to the working parts, while the stator windings are enclosed in rubber insulation, high current densities are employed, water is used as a lubricant for the bearings and as a cooling agent for the parts of the machine from which heat has to be extracted. A special jet of water is also arranged to play on the stator lamination in the air gap. This jet is supplied by a pipe from the pump casing, so that when the motor is working out of the water the same conditions are set up as when submerged.

Fig. 1 represents a perspective view of one of these motors with pump combined, Fig. 2 is a view of a warship with water-tight compartment furnished with submersible pumps, and Fig. 3 shows the application of such pumps for salvage purposes.

The motor can be attached to any type of centrifugal or other pump, and can be lowered either in the combined form or mounted on the same bed plate into the water, and thus avoid any necessity for priming. For salvage purposes the arrangement appears to have special merit. Take, for example, the case of a large vessel stranded on a rock-bound coast, exposed to the sea, and full of water from end to end, and which would be generally considered an apparently

hopeless case, owing to the necessity of the provision of duplicate sets of pumping plant, with the attendant risk of its being washed away on the approach of heavy weather. With a submersible motor plant lowered to any deck below water, and placed in position by divers, and worked from generators on the salvage steamer, either alongside or at a distance away, these difficulties disappear at once. If heavy weather should come on, it would be only necessary to disconnect the cables and clear off, while the pumps and motors, being under water well down in the hold of the ship, would be in comparative safety, so that on the weather moderating the plant could be immediately started up again by merely connecting the cables.

It is obvious that this type of motor is very applicable to boat hoists, winches, capstans and anchor windlasses, as seas breaking aboard or spray covering the motor will not interfere with the working of the plant in any way.

It is claimed by the manufacturers that the Submersible Motor Pumping Plant is as indispensable to the battleship as to the liner, as in the former case it may be the means of keeping the ship afloat and enabling her to continue the engagement, when under ordinary conditions she would be obliged to leave the fighting line, while in the latter case, a passenger ship fitted with numerous water-tight compartments, in accordance with modern practice, and provided with these pumping plants, would inspire confidence among the passengers and be an important safeguard in the event of collision or grounding.

Fig. 2.

Fig. 3.

White Star Liners "Titanic" and "Olympic".—The *Titanic* will leave Southampton on her first voyage to New York on April 10th, 1912. It is stated that the *Olympic*, recently in collision with the cruiser *Hawke*, will resume her sailings on November 29th.

"Conte di Cavour."—The [illegible] in which the sister ships of the *Conte di Cavour* and *Doria*, [illegible] which formed the subject of an article in our October number are being built are as follows, [illegible] the *Cavour* [illegible] at the Ansaldo Armstrong yard, Sestri Ponente, and the *Doria* [illegible] at the Odero yard, Genoa, and not as stated in the October issue.

The Machine Tool and Engineering Association, Ltd.—A notable addition to the Roster of the Machine Tool and Engineering Association, Ltd., was made at the last meeting by the election to membership thereof of Mr. Edwin Adams, of Messrs. Hulse & Co., Ltd. The association continues to gather strength, including amongst recent new members being the following:—Craven Bros., Ltd., Hulse & Co., Ltd., Birmingham Small Arms Co., Ltd., S. Osborn & Co., Ltd., Consolidated Pneumatic Tool Co., Ltd., B. & S. Massey, Roberts Bros., Hoffman Manufacturing Co., Ltd., Dron and Lawson, Ltd., and Joshua Heap & Co., Ltd.

MARINE JET PROPULSION.

ON Friday, October 13th, Mr. Rankin Kennedy, C.E., of Glasgow, read a paper before the Manchester Association of Engineers on the above system of marine propulsion. The jet propeller is an old device for the propulsion of vessels and Mr. Kennedy agreed that each practical test of the system had been a sorry failure, but he held that the fault was not due to any inherent defects in the system, but entirely to the use of very inefficient machinery and faulty design. From the paper it may be gathered that there are three systems of jet propulsion, *viz.*:—

1st. That in which the water is taken into the vessel, and the velocity of the vessel impressed upon it, by an expenditure of energy, which is lost, and then has a velocity impressed upon it by a pump discharging it through a jet, the reaction propelling the ship. 2nd. That in which the water is taken into the pump at the velocity of the ship, is accelerated by the pump and discharged through a jet, the reaction propelling the ship. 3rd. That in which the water enters the vessel at the velocity of the vessel, and this velocity is reduced to a value between 5 ft. and 10 ft. per second in a venturi expanding tube, before it enters the pump, the velocity being converted into pressure. The pump then increases the pressure on the water, which in discharging through a converging nozzle acquires a velocity the reaction of which propels the vessel. The first system has been proved a failure by direct tests. The energy lost in impressing the velocity of the ship upon the incoming water reduced it to a hopeless inefficiency and the pump used had an efficiency of about 48 per cent. only. The second system has also been tried and proved a failure, but from different causes. The failure was here due to the great losses in the centrifugal pump taking the water in at the speed of the ship—30 ft. to 40 ft. per second—and the pump itself being inefficient. The third system, which the author says is really the only truly scientific one, has not been tried on a large scale, but as it steers clear of the obviously inefficient practices of the other two, and may be worked with a highly efficient pump, it may be reasonably expected that jet propulsion on this system would show really what it could do in comparison with other systems of propulsion. Mr. Kennedy thought that something of the nature of the new Humphrey gas pump would be necessary to make the jet propeller compare favourably with the ordinary propeller.

THE SOCIETY OF ENGINEERS (Incorporated) will hold an ordinary meeting on 6th of November. A paper will be read on "Two-cycle Engines" by Mr. Robt. W. A. Brewer.

THE SIR JOHN CASS TECHNICAL INSTITUTE.—The opening lecture of the courses of instruction on "Fuel" was given by Mr. Brame on October 16th. The lecture was an extremely interesting one.

NORTH-EAST COAST INSTITUTE OF ENGINEERS AND SHIPBUILDERS.—The twenty-eighth annual meeting was held in Newcastle-upon-Tyne on October 27th. The president, Colonel R. Saxton White, V.D., delivered a brief address, and Mr. Ernest Saxton White, B.Sc., (member) read a paper on "The relationship between residuary resistance horse-power and forms of vessels." A synopsis of the paper is as follows :—(a) Various methods of calculating horse-power ; (b) Factors in the forms of vessels affecting residuary power ; (c) Combination of factors to give an exponent of the designed speed for residuary power ; (d) Table of results.

AUXILIARY MACHINERY FOR SHIPS.

THE development of machinery for propulsive purposes operated by other means than by steam, has given an impetus to the design and manufacture of auxiliary machinery of special type to deal with the new conditions. This development is particularly noticeable in the matter of internal combustion engines.

We have much pleasure in giving some particulars of a very interesting auxiliary plant for use in oil-driven or gas-driven launches or ships, which Messrs. Reavell & Co., of Ipswich, have recently placed upon the market. This plant is illustrated in Fig. 1, and consists of a Reavell patent Duplex compressor, gear-driven from a Reavell vertical high-speed oil engine, while at the opposite end the oil engine shaft is

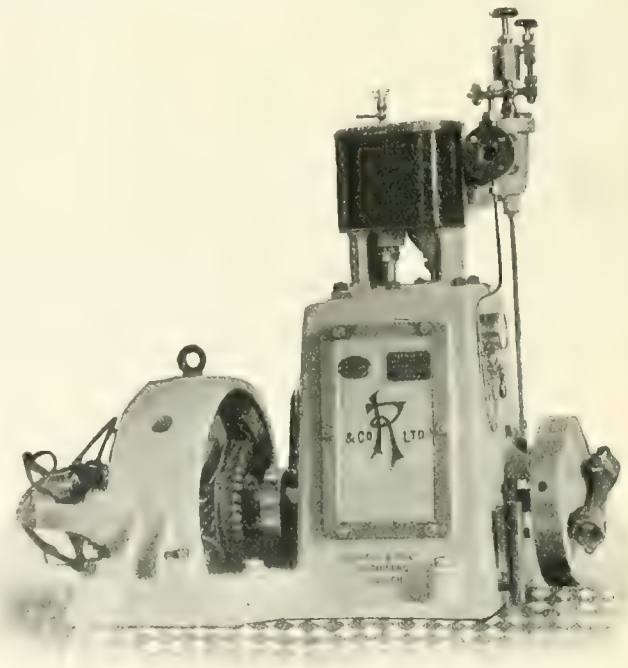


Fig 3

directly coupled to a centrifugal pump. The compressor is used for pumping up the compressed air receivers from which the supply of compressed air for starting the main engines is taken. In ships having large Diesel engines, of course, there are usually other engines in addition to the main engines for which this compressed air would be used, and in this connection it is interesting to note that in cases where compressed air for starting Diesel engines is required, needing a pressure of from 800 to 1000 lbs. per square inch, a "Reavell" compressor capable of working at this high pressure can be very easily substituted. For engines of the ordinary type, however, pressures from 250 to 400 lbs. per square inch, are generally used.

The centrifugal pump can be used for a variety of purposes, such as drawing water from the bilges, or for circulating and other duties, and the full power of the engine can be utilised to drive it, if necessary, as the pinion driving the compressor is arranged so that it can be slid back, so as to throw the latter out of gear. It will also be noticed that a pulley is fixed to

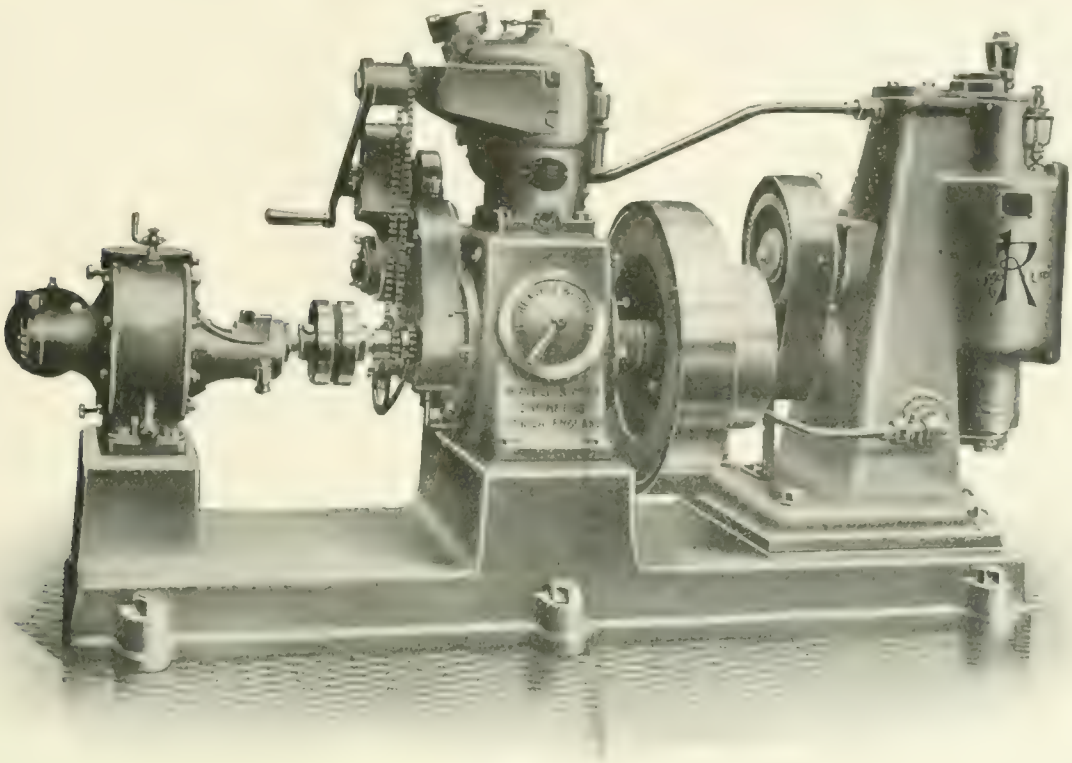


Fig. 1

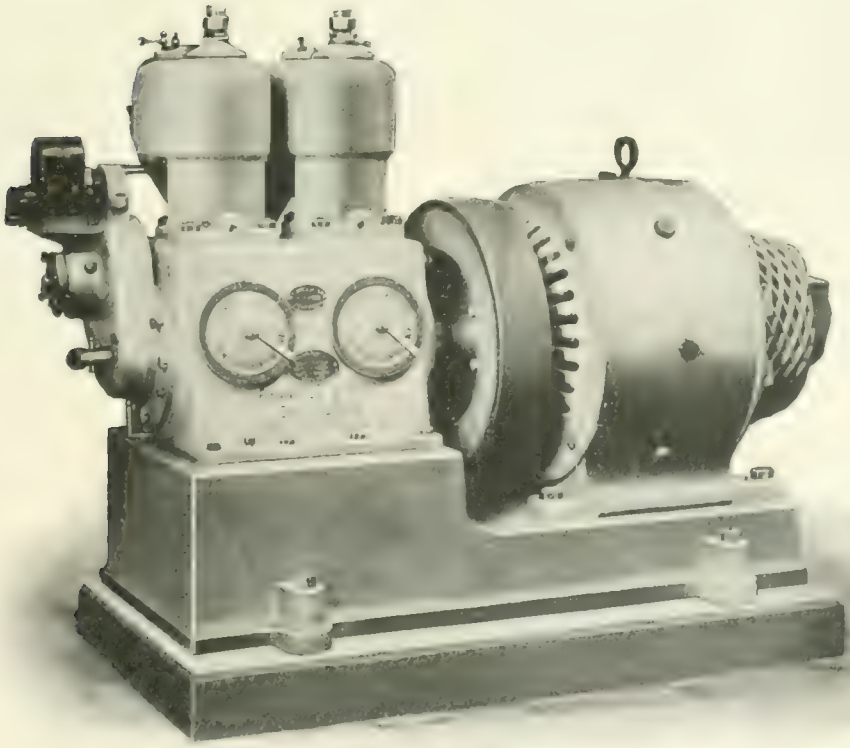


Fig. 2

Auxiliary Machinery for Ships by Messrs. [illegible] & Co., Ipswich.

the flywheel of the engine, and if necessary the full power of the engine can thus be utilised for driving a dynamo or other machinery by belt, as the compressor can be thrown out of gear as described and the suction water can be shut off from the pump, so as to prevent it from absorbing power.

We understand that Messrs. Reavell & Co. have recently supplied two sets, as illustrated, to the well-known firm of Clyde shipbuilders, Messrs. W. Beardmore & Co., and it is interesting to note that one of them is installed on the Marquis of Graham's yacht in connection with the Beardmore engine mentioned on page 87 of our October and current issues.

The firm have made a speciality of oil engines for electric lighting, and one of these sets is illustrated in fig. 2, and represents a type of which several have been supplied for ship lighting. The advantages of oil engines for ship lighting are numerous, and among them may be pointed out the fact that it is not necessary to keep a donkey boiler, with its attendant fireman, in service to keep steam up while the ship is in port, as the oil engine can be started up instantaneously and needs practically no attention once it is set running, the lubrication being on the splash principle and entirely automatic.

As an interesting comparison we show in Fig. 3 a very neat and compact steam lighting set which Messrs. Reavell manufacture to supply the needs of customers who require sets driven by steam.

ELECTRICAL EXHIBITION.

THE Electrical Exhibition which was opened on Sept. 23rd at Olympia, London, and closed on Oct. 21st, has added further proof to the popularity and the value of exhibitions as a means of adding to the general knowledge of what can be done by means of electric power. Since the last electrical exhibition held three years ago at Manchester, many improvements and advances have been made in fittings and appliances, as well as in the more economical supply of current and in greater economy in the use of it. The economy was well illustrated by the lectures given and by the diagram displayed by the lecturer, when it was set forth what one B.T. unit of current could do in the every-day matters of life, whether for household purposes or trade—lighting, heating, cooking, machine work, etc. An interesting note in the catalogue by Mr. Justus Eck, M.A., deals with the improvement made in arc lamps of recent years, so much so that its efficiency has been increased fivefold without sacrificing its durability. The emission of heat from a paraffin oil lamp is stated to be 3,644 calories per hour and the products of combustion 2,360 c.ft. of CO_2 per hour, while the improved flame arc lamp emits but 20 calories and vitiates the atmosphere by only ·5 c.ft. of CO_2 per hour. It is recalled to us that the first exhibition of electrical work was at the Crystal Palace in 1881, since when we have seen remarkable changes. The first exhibition of the series, of which this year's is the third, was held at Olympia in 1905, and between that date and the present a great work has been done. It is to the Electrical Manufacturers' Association that our thanks are due for the series and for the enlightenment which has been afforded by their means—we congratulate the Association on the success which has attended their ventures. A large section of the exhibition was of special interest to the householder, more so than in former years, hence there was a closer appeal to visitors whose interests were more of a general than a specific character. The demonstrations at several of the stalls were interesting and impressed the value of the exhibits. The vexed question of the delicacy of the lamp, especially the metal filament, was argued by ocular demonstration, and the devices adopted to prove the strength of the filaments were convincing, the jerky swing and the vertical jump with several lamps attached were good illustrations of what the electric lamp of to-day can withstand. Great improvements have been made in the fittings and connections, and each maker vied with another in the designs to minimise labour and improve the conditions of working to lessen risk to the operator and consumer.

Amid such a display of fittings and connections as well as of appliances and combinations, with which the various stands were loaded, one's sense of gratification at the obvious improvements tends to shade the desire to single out for special notice those firms—of whom there were several—which excelled in appealing to the engineer, apart from the householder. These are and will be referred to at length in this and other issues of this journal, so that we may confine ourselves here—with perhaps a few exceptions—to a few general observations. As the pioneers in the manufacture of lamps, the Edison-Swan Co. claim attention, and the small pamphlet issued by the firm is interesting historically, as it points out that Sir J. Wilson Swan, in 1880, made the first carbon filament lamp, while simultaneously with this, Mr. T. A. Edison was experimenting in the same direction in America. Experiments made by the Company with a variety of metals with a view to manufacture lamps with metallic filaments resulted in the adoption of Tungsten filament lamps, which are durable and economical of current and are manufactured for voltages of from 2 to 260 and with candle power of from 1 to 1000. There are several metal filament lamps on the market, and most of these were on view, the Tantalum, Sunbeam, Brimsdown, Osram, Luxrae, Gral, Mazda, Metalite, Pope, etc. The advantage gained by the use of the metal filament is made manifest in the reduction of current as compared with the carbon filament lamp, and although this comes home quicker to the householder who pays for the current per unit than to the engineer who has ample current at disposal, there are many steamers where the electric plant has little or no surplus margin to begin with and the tendency is to add on lights from time to time until the machine is overloaded, and it is a question whether to reduce the candle power where less can serve or watch the switches closely so that the number of lights may not be exceeded. The latter expedient is fraught with risk. In view of this the metal filament lamp is now largely adopted for ship work and is giving satisfaction. The oil motors for dynamo work on exhibition were of great interest and each type is worthy of an illustrated descriptive article. A Mirrlees Diesel engine of 150 B.H.P. coupled direct to a dynamo was running with four different kinds of oil, supplied from tanks to show the wide range of fuel with which the engine would work. A good assortment of fine instruments and accessories for testing and recording were on view, which might be referred to on another occasion, some indeed have previously been illustrated in our pages.

FRENCH SUBMARINE SALVAGE BOAT.

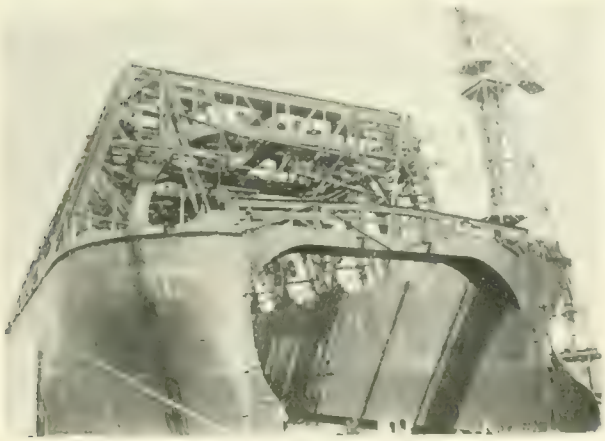
THIS interesting craft was launched from the yard of the Loire Works, St. Nazaire, on the 22nd September, to the order of the French navy. The French fleet of submersible craft is the largest in the world, and it is to be wondered at that she has not built such a vessel before. The vessel, which has been built with much secrecy, is of a strange general appearance, as the accompanying illustrations show. She is not self-propelling, as the German salvage boat, and her conduct during salvage operations will be watched with much interest by all interested. The main particulars of the vessel are as follows:—Displacement loaded, 2,300 tons; length over all, 328 ft.; main breadth, 84 ft.; breadth of each hull, 20 ft. 8 ins.; space between each hull, 42 ft. 8 ins.; depth, 26 ft. 3 ins.; draught when light, 4 ft. 7 ins.; lifting power, 1,000 tons. The lifting power will be electrically driven.

THE ARMOURED CRUISER "AUSTRALIA."—This cruiser, building for the naval service of the Commonwealth of Australia, was launched on the 25th October from the yard of Messrs. John Brown & Co., Ltd., of Clydebank, by Lady Reid, wife of the High Commissioner. The vessel is turbine-driven, and her tonnage is 18,800.

LLOYD'S REGISTER.

AT the close of the year ended 30th June, 1911, 10,400 merchant vessels, registering over 21 million tons gross, held classes assigned by the committee of Lloyd's Register. Classes were assigned by the committee to 616 new vessels. Their registered gross tonnage amounted to 1,098,476 tons. As compared with the figures for the preceding twelve months, the present return shows an increase of 165,420 tons as regards steamers, and 3,110 tons as regards sailing vessels. Possibility of internal combustion engines being employed as the motive power of large merchant vessels was becoming a question of immediate and

French Submarine Salvage Boat—Set to the launch



Stern View of the French Salvage Vessel

practical importance. Mr. Milton, the Society's chief engineer-surveyor, made visits to many of the firms on the Continent who have given special attention to this form of engine for marine work. In the spring of this year, Mr. Milton wrote an important paper on "Diesel Engines for Sea-going Vessels," embodying the results of his investigations, which was read at the meetings of the Institution of Naval Architects. The paper and the discussion thereon have been reprinted, and will be supplied to shipowners and others interested, upon application. At the present date there are building, or about to be built, with a view to classification in Lloyd's Register, twelve merchant vessels which will be fitted with oil engines. The largest of these vessels will exceed 8,000 tons gross, and five others will be of 4,500 tons gross and upwards. The majority are to be propelled by means of large Diesel engines. One set, of the double-acting two-stroke cycle type, has been erected and is now undergoing exhaustive trials in the shop preparatory to being fitted on board. The other engines are all single-acting, and include examples of both the two-stroke and four stroke cycle types. During the twelve months ended 30th June, 1911, fifty-four steamers of upwards of 5,000 tons each have received the 100 A1 class, and five vessels, each exceeding 10,000 tons, have been assigned this classification since the issue of the last annual report. At the present date, there are several vessels exceeding 10,000 tons, which include the *Aquitania* (45,000 tons), and *Laconia* (18,000 tons), each being built to the Society's class. The Society's returns for the quarter ended 30th September, 1911, show that the tonnage in course of construction under the survey of the Society's surveyors was 1,198,792 tons gross, of which 195,295 tons were being built abroad. Thirty-eight vessels of the Isherwood type of 157,299 tons, have been built to the Society's classification, while thirty-four others, of over 155,000 tons, are now in course of construction under the Society's survey. The scantlings approved for the Isherwood vessels are such as to afford the full structural strength represented by the Society's classification standard. There has recently been an unusually great demand for new steamers intended for carrying oil in bulk. At the present time practically the whole of such tonnage is being built under this Society's survey for classification and in accordance with the Society's rules for such vessels. The growing tendency in the direction of widening the frame spacing of steamers, dispensing with side stringers, and making double bottoms more readily accessible, receives the careful attention of the Society's technical staff, who are always ready to assist shipowners and shipbuilders in giving efficient expression to their wishes in these and other particulars. During the year there has been considerable development in the carriage of refrigerated cargoes, especially from the Argentine Republic. The most recent vessels are subdivided into numerous separate chambers fitted for carrying either "frozen" or "chilled" cargoes, a much larger proportion of the cargoes now being "chilled" than was formerly the case. There are now 139 vessels holding the Society's refrigerating machinery certificate (Lloyd's R.M.C.), and twenty-seven vessels in course of construction which will be equipped with refrigerating machinery and appliances under the special survey of the Society's surveyors. For some years past the services of the Society's surveyors have been sought for the survey during construction of large cold storage buildings, together with the refrigerating plant in connection therewith, and the arrangements necessary to carry out this duty in a proper manner are now receiving the consideration of a special sub-committee appointed for the purpose. Since the issue of last year's report the question of an international agreement on the subject of the load line of ships has been further advanced by the adoption of the British freeboard tables and rules by Sweden, whose freeboard regulations, like those of Germany, France and Holland, are now formally recognised in this country. Certificates of classification of Lloyd's Register are now recognised by the French authorities

as exempting vessels from undergoing inspection at the hands of the Government surveyors, and surveys held by the surveyors to this Society are accepted by the Governments of several other countries, including those of Norway, Sweden, Denmark, Russia and Spain. There are now recorded in the Society's register book 1,013 vessels fitted with wireless telegraphic installations, and 566 with submarine signalling apparatus. The number and gross tonnage of yachts classed in the Society's register of yachts are 672 yachts of 119,447 tons. Of these, 324 of 107,823 tons are steam yachts and 302 of 8,519 tons are sailing yachts, while 46 of 3,105 tons are fitted with internal combustion engines. The largest sailing yacht built this year in the United Kingdom is the *Waterwitch*, 352 tons (Thames measurement), which is classed in the Society's register of yachts. The *Enchantress*, a sailing yacht of about the same tonnage, which was built in the United States this year, holds the Society's class. The year under review is noteworthy for an important amendment which has been made in the constitution of the Society, providing for the direct representation of shipbuilders and engineers on the general committee of management.

FOREIGN NOTES.

U.S.A.

RECENTLY the wife of the President of the Argentine Republic christened the Dreadnought *Rivadavia* on the launch taking place at Quincy, Massachusetts. The vessel has been built by the Fore River Shipbuilding Co. for the Argentine Republic, and is of the following dimensions :—Displacement, 26,000 tons ; length, 585 ft. ; beam, 93 ft. She is turbine driven, designed horse power 39,500, speed 22·5 knots. This is one of the battleships which were so strongly competed for by our builders, who were, however, underbid by the Americans.

The orders for the eight destroyers latterly passed by Congress will be placed as follows :—William Cramp & Sons, four boats at 756,000 dollars, the Bath Ironworks two boats at 764,000 dollars, the New York Shipbuilding Co., one boat at 777,500 dollars, Fore River Shipbuilding Co., one boat at 779,459 dollars. All vessels have to be delivered twenty-four months from date of contracts placed in August last. The battleship *Utah* obtained a speed of 21·64 knots at the trial run, the engines developing 28,477 h.p.

The General Electric Co., of Schenectady, has entered into an agreement to engine the fleet coaling ship *Jupiter*, now building on Mare Island Navy Yard, with a new system of propulsion.

The New York Shipbuilding Co., of Camden, New Jersey, launched on September 23rd the battleship *Moreno*, which they are building for the Argentine Republic. The *Moreno* is a sister ship of the *Rivadavia*, building for the same country.

Germany.

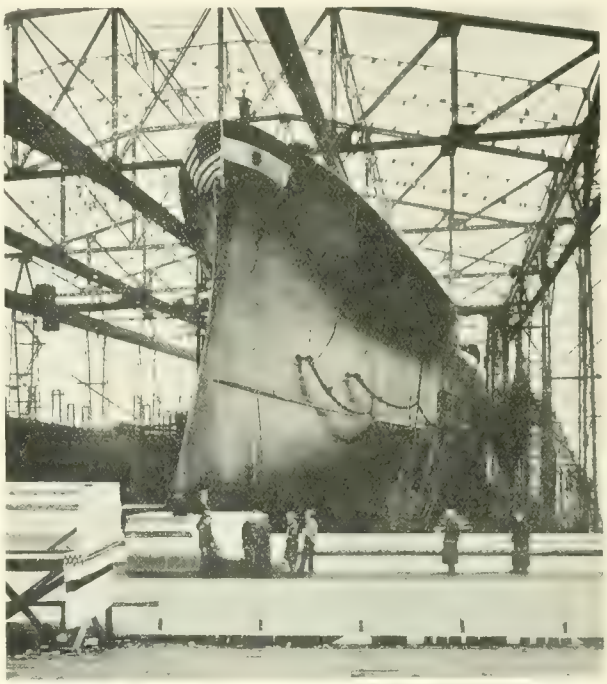
The torpedo destroyer *Cordoba*, which has been built at the Schichau yard at Elbing, has just made her trial run at sea off Pillau fully equipped. The run was very successful and a speed exceeding the contract speed of 32½ knots was attained. The machinery worked faultlessly, so that the Argentine Commission was highly satisfied. The second boat *La Plata*, will also be ready shortly to undergo its trials.

The s.s. *Albany*, sister ship to the *Freemantle*, has just been launched at Geestemünde. Her dimensions are :—Length, 142·76 m. ; beam, 17·37 m., with a deadweight capacity of 9,500 tons at 7·62 m. draught. There are seventeen derricks and fifteen steam winches provided to serve the seven spacious hatches. The sixteen derricks have a carrying power of 5 tons and one of 25 tons. A "wireless" plant is installed. Her engine is a triple-expansion of 3,000 i.h.p., speed 12½ knots. The *Albany* is being built to the order of the German Australian Steamship Co.

The new super-Dreadnought *Helgoland*, built at the yard Howaldt Kiel while carrying out her trials in the Baltic attained a speed of 22 knots, a record for German Dreadnoughts. Her contract speed was 20·5 knots.

The three battleships, the orders for which the Admiralty has placed with German firms, are to be engined with turbines of three different types. The *Ersatz Kurfuerst Friedrich Wilhelm* is being built at Hamburg and is to be fitted with turbines of the type of the General Electric Co. Parsons turbines are to be installed on the battleship *S*, which Wilhelmshaven is building, and the third ship, *Ersatz Weissenburg*, being built by a yard on the Weser, will be engined by Bergmann turbines. This action of the Admiralty will enable comparisons between the three types to be made, and the results are awaited with great interest.

A cargo steamer was recently launched from a shipyard at Vegesack for the Hamburg American line, and was given the name *Uckermark*. The vessel has a deadweight capacity of 8,400 tons. Her length is 126·49 m. and beam 16·105 m.



The Argentine Dreadnought *Rivadavia*, built by The Fore River Shipbuilding Co., U.S.A., ready for launching.

The hull is constructed with horizontal frames to the highest class of the German Lloyd. The speed of the vessel will be 11½ knots per hour and her engines triple-expansion of 2,700 i.h.p.

An order for five coaling vessels has been placed with a German yard by the Admiralty. This is a first step towards creating a fleet of special service ships for the purposes of the fleet, such as workshop, convoy and hospital ships. The Admiralty has at present only one coaling vessel, the *Titania*, with the cruiser fleet in the Far East.

Various sales of second-hand steamers have been effected by German owners. The s.s. *Scotia*, 628 tons, has been sold to Swedish buyers for about 40,000 krone. The salvage tugboat *Borkum* has been sold by the owners, a steam-tug company, to a firm in Russia to be employed in salvage work. The tug and ice breaker *Walter* has also been sold to Russia. The *Nize*, of 1,553 tons, has been bought by a firm in Norway for the price of £3,400, the *Helicon*, 1,550 tons, has also been sold to that country.

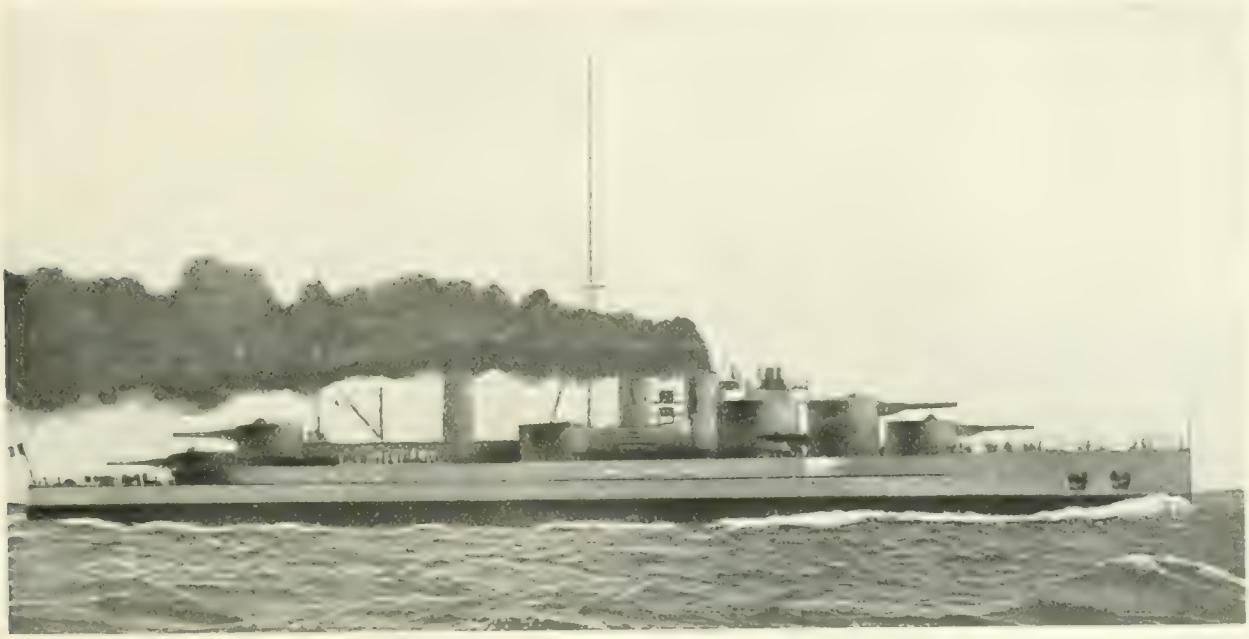
The fishing steamer *Nordsee* has also changed owners, having been bought for Sweden for M22,000. The s.s. *Elsa*, of 500 tons, built at Flensburg, has been purchased by Messrs. M. H. Blan & Co., of Gibraltar. The s.s. *Albano*, of the Hamburg line, built in 1886 by Messrs. Harland & Wolff, has been sold for 255,625 francs to the Messageries Maritimes. She has been given the name *Breton*, and will be put on the

Marseilles Havre London route for cargo purposes.

A new steamer, the *Mayotte* has just been completed at a Hamburg yard for the German East African Line. Its trial runs were most satisfactory. A quadruple engine of 3,300 h.p. gives the *Mayotte* a speed of [illegible] knots. Her dimensions are: Length, [illegible] metres; beam [illegible] metres and draught with a deadweight of 9,000 tons, 7·7 metres. The cargo is dealt with by fifteen steam winches and twenty-eight derricks, two for lifting [illegible] tons each, the others [illegible] to [illegible] tons. Refrigerating apparatus and other necessary arrangements for the tropics are provided.

France.

The two most powerful battleships for the French fleet were launched on the 22nd and 23rd September, *viz.*, *Jean Bart* and *Courbet*, from the Brest and Lorient yards respectively. They were laid down in [illegible] and are to be completed in 1912. The leading particulars are: Displacement 23,467 tons; length, waterline, 541 ft. 4 in.; breadth, 88[illegible] ft.; draught 2[illegible] ft.; machinery Parsons turbines, boilers Belleville and Niclausse; designed h.p., 28,000; speed, 21 knots; coal capacity, normal, 900 tons; maximum, 2,700 tons. Each vessel will carry 941 officers and men.



The French Battleship *Jean Bart* (as she will appear when completed), launched a short time back from the Brest Yard.

Holland.

A barge was recently launched at a shipyard in Balires for Mr. Fred Drughorn in London. The length is [illegible] m. and the carrying power about [illegible] tons. The barge was given the name *[illegible]* at the launch. The Dutch shipyards have various other orders in hand, among them being a canal boat of 550 tons and two coal lighters to a Swedish order.

Peru.

It is reported that Peru has placed an order for seven submarines with American shipyards. The French shipyard Claparède of Argenteuil has just finished a small steamboat called *Melitta* to the order of a Peruvian shipper. The *Melitta* is to navigate the rivers and will be a "floating bazaar," where the natives can purchase their requirements. The *Melitta* will start shortly for its destination, crossing the ocean under her own steam. An English captain will take her out and will command her in Peru.

China.

The Government is said to have placed an order for two cruisers of [illegible] tons each with a Chinese shipbuilding yard. These cruisers are to be used as coastguards and for this purpose will be equipped with a "wireless" plant. Five smaller boats of 140 tons also for the purpose of policing the coast have been placed with a Chinese yard.

Italy.

Recently the Italian [illegible] under trial in the Bay of Naples, ran on to the Pausilippo rocks. A preliminary examination led to the discovery of two wide rents through which the water poured. The speed at the time of striking the rocks was 19 knots. Driven high aground, it was at first impossible to get her off even when relieved of her guns. She was hauled off the rocks on Sept. 15th and towed into graving dock. It will take a considerable time and a large sum of money before the vessel will be in commission again. The *[illegible]* was laid down at Castellamare in [illegible] and launched July 27th [illegible].

Argentine.

The South America development which has been witnessed in connection with this country during the last thirty years has been very considerable. The meat trade has been so well established, while the great care which has ever been exercised in connection with the stock of cattle, the selection and purchase of breeding animals, the inspection and attention to the abattoirs have contributed to the prosperity of the Republic.

Canary Isles.

An addition to the oil-engined vessels employed on coastal service here has been made by the building of three [illegible] ft. launches to serve as tenders to carry passengers to and from the steamers calling at the Islands. These launches are fitted with Parsons (Southampton) oil engines of about [illegible] h.p., giving a speed of fully 9·5 knots.

Durban.

Messrs. Brooke supplied the oil engines and machinery of about 18 h.p. for a cruiser yacht [illegible] ft. long built by the Natal Yacht Co. The boat has a [illegible] appearance and is a credit to the builders. There is quite a number of motor boats now plying about the precincts of the port.

Russia.

The *[illegible]* a Russian "Dreadnought" was launched in October at St. Petersburg. She was laid down in [illegible] and has therefore been on the stocks twenty-seven months. Her displacement is about [illegible] tons, length [illegible] ft., beam [illegible] ft., draught [illegible] ft.

Industrial and Trade Notes.

THE CLYDE AND SCOTLAND.

(*From our Own Correspondent.*)

The New Cunarder.—The exact dimensions of the new Cunard liner *Aquitania*, which is being built by Messrs. John Brown & Co., Clydebank have not yet been published, but the following may be accepted as authoritative as regards the length of the vessel:—Length, 865 ft. between perpendiculars, which is 12 ft. 6 in. greater than the *Olympic*, the largest vessel in the world, and 103 ft. greater than the *Lusitania*. With her "overhang," or counter, the *Aquitania* will be 905 ft. in length.

The New Allan Liners.—Twelve leading shipbuilding firms have tendered for the construction of two new Allan liners of about 15,000 tons gross, 570 ft. long, 69 ft. broad and 46 ft. deep, to carry 250 first, 525 second and 1,000 third-class passengers. As to propelling machinery, the firms tendering have been given a free hand; and the engines may be either reciprocating or reciprocating and turbine. The vessels will have a sea speed of 18 knots—one knot faster than the *Victorian* and *Virginian*, the turbine-propelled vessels added to the fleet six years ago.

Messrs. Alex. Stephen & Sons, Linthouse, who, early in October, launched the second of two large steamers built for the Indian service of the Anchor Line, and have still most of their berths occupied with vessels of large tonnage and good class, are to build two steamers of good size and with extensive cold storage accommodation, for Messrs. Elders & Fyffes, London.

Messrs. Barclay, Curle & Co., Whiteinch, have added to their stand in the Scottish Exhibition at Kelvingrove, Glasgow, a model of the Diesel oil-engined ship, *Jutlandia*, which they are building for the East Asiatic Company, of Copenhagen. It is expected that the vessel will be launched this month and run trials in December.

Messrs. Wm. Denny & Bros., Dumbarton, have received an order from the Turbine Steamers, Ltd., Glasgow, for a large, powerful turbine steamer of the most up-to-date class, with special manœuvring appliances which will enable her, if required, to sail on the upper reaches of the Clyde. The vessel will be ready to take her place next season on the Inveraray—Campbeltown route. The vessel now ordered from Messrs. Denny is to replace the *Queen Alexandra*, which was seriously damaged by fire some time ago. The latter vessel has been sold to the Canadian Pacific Railway Co. for their coasting trade. Early in October she was towed from Greenock to the yard of Messrs. Denny Bros. at Dumbarton, where she was built in 1902, and where she will undergo extensive repairs at a cost of £9,000. These having been completed, she will proceed to Vancouver for daylight service in that region. Messrs. Denny have also been commissioned by the Campañia Trasatlantica, of Cadiz, to build two triple-screw steamers for service between Cadiz and Monte Video. The vessels will be about 490 ft. in length, and are to develop a speed of between 17 and 18 knots. They are to be fitted with turbines and two sets of reciprocating engines, and are to have accommodation for a large number of passengers.

Messrs. Napier & Miller, Old Kilpatrick.—Since certain orders, chronicled in our "Marine Motor Notes" column, were received, Messrs. Napier & Miller have been commissioned by the Nippon Yusen Kaisha, through their Glasgow agents, Messrs. A. R. Brown, McFarlane & Co., to build a passenger and cargo steamer, classed 100 A1 at Lloyd's, and of the following dimensions:—Length, B.P., 345 ft.; breadth moulded, 46 ft.; depth moulded, 28 ft. The vessel is specially designed for the Eastern trade, and will have a speed of 14 knots, and be fitted throughout with electric light. The machinery, which will be supplied by Messrs. Dunsmuir and Jackson, Govan, will consist of a set of triple-expansion engines, having cylinders 25 in., 41 in. and 68 in. diameter respectively, with a stroke of 48 in. Special interest attaches to the condensers, which are to be on the "Contraflo" principle, by which a high vacuum is maintained economically with high temperature sea-water.

The Clyde Shipbuilding and Engineering Co., Ltd., Port Glasgow, have received an order for an oil-engined vessel intended for service on the Great Lakes of America. The vessel will be 325 ft. in length, and will have Diesel oil engines of over 1,000 I.H.P. The engines, as well as the hull, will be constructed by the Clyde Shipbuilding and Engineering Co., and will be of the Carel Frères type. This is the first oil-engined vessel ordered from any firm in the Greenock—Port Glasgow district. The same firm have also on hand two large cargo-steamers, and are busily engaged in repair work. They are repairing and lengthening an Elder-Dempster liner; and the paddle steamer *Caledonia* is being altered and repaired for the Caledonian Steam Packet Co. Besides this, the firm are erecting three sets of engines for vessels building at Trieste, and these will be shipped to that port shortly. The firm have also completed the extensive machinery and structural repairs to the Egyptian gunboat *Abd-el-Monaym*, and the renovated vessel is to leave for Alexandria shortly.

Messrs. Robert Duncan & Co., Port Glasgow, have received an order from Messrs. W. S. Miller & Co., Glasgow, for a single-deck steamer of 6,400 tons deadweight carrying capacity.

Messrs. Murdoch & Murray, Port Glasgow, have contracted to build a steel saloon paddle-steamer for Mr. John Williamson, Glasgow. The vessel will run on the Clyde next season, and will have compound surface-condensing engines by Messrs. Rankin & Blackmore, Greenock. Messrs. Murdoch & Murray have also received an order to build, for Australian owners, a passenger and cargo steamer, which will be engined by a Glasgow firm.

Messrs. Ferguson Bros., Port Glasgow, have received an order from the Clyde Shipping Co., Glasgow, to build and engine a powerful, single-screw tug for that Company's river service. The vessel will be similar to the *Flying Serpent*, launched in February last; and it is of interest to state that the vessel now ordered is the eighth of its kind built by Messrs. Ferguson Bros., within recent years, for the same owners.

Messrs. Scott's Shipbuilding & Engineering Co., Greenock, have received an order from the Holt Line to build and engine a large passenger and cargo-steamer of 12,000 tons for that Company's new Australian service. This is a notable augmentation of the large amount of tonnage which Messrs. Scott have on hand. This includes several large merchant liners and the super-Dreadnought *Ajax*, and a Government depot ship. It is expected that the firm will launch the *Ajax* in the early part of December. There is thus every promise of the present year proving a record one for heavy warship launching on the Clyde.

The Dundee Shipbuilding & Engineering Co. have received an order from a Newfoundland firm for a mail and passenger steamer of 900 tons.

Messrs. Ramage & Ferguson, engineers and shipbuilders, Leith, have lately put through very successful trials the twin-screw passenger steamer *Koopa*, built for the Brisbane Tug and Steamship Co., Ltd., Brisbane, Queensland. On the measured mile in the Firth of Forth, a speed of over 16 knots was obtained. The requirements of the contract as to speed and trim, draught and stability, which were of the most difficult nature, were fully conformed to. The vessel is 192 ft. long, by 28 ft. beam, and 16 ft. 6 in. depth, and is propelled by two sets of triple-expansion engines, steam being supplied by large multitubular boilers fitted with Howden's system of forced draught.

Dock Extension at Leith and Newhaven.—Leith Dock Commission have authorized the placing of an order for a new hydraulic swing bridge at the Old Dock with Messrs. Armstrong, Whitworth & Co., Newcastle-on-Tyne. They have also agreed to accept the offer of Messrs. Cowans, Sheldon and Co., Carlisle, for the provision of a crane of 110 tons capacity and capable of lifting to about 80 ft. above the water level of the dock, and projecting 42 ft. from the face of the quay. It will thus reach considerably beyond the centre of the largest steamer which could pass through the locks. The foundations, sidings, etc., for the crane will cost about £2,800, and the crane itself about £8,000. A sub-committee of the Dock Commission have reported in favour of proceeding with a long-mooted extension of Newhaven Harbour, and the linking of it up with the Port of Leith. This extension will embrace an area of about 30 acres and involve an expenditure of £200,000. The contemplated

work includes the deepening of the Newhaven entrance channel so that fishing vessels may enter at any state of the tide. The building of a market and the provision of other facilities for the fishing trade. This part of the project will be proceeded with as soon as Parliamentary Powers are obtained. The larger part of the scheme, the linking up of Newhaven and Leith, will not materialize for some time, but when undertaken will involve an expenditure of £400,000, and will include the lengthening of the pier and the deepening of Leith entrance channel. The fine new graving dock which has been under construction for some time with entrance from the Imperial Dock, is now practically complete and only requires some of the pumping plant and other power equipment to make it ready for being brought into service.

THE TEES AND HARTLEPOOLS.

(*From our Own Correspondent.*)

Whitby.

Messrs. The Robinson Steamship Co. have sold the s.s. *Meadowfield*, of 2750 tons deadweight, to Messrs. Maclay and McIntyre, of Glasgow, for about £20,000.

Middlesbrough.

Messrs. Sir Raylton Dixon & Co., Cleveland Dockyard, are reported as having secured an order for a cargo steamer for local owners. They continue to be very busy, having a good amount of work on hand.

Messrs. W. Harkess & Co., Ltd., report nothing new during the month, they, however, continue to be busy both on old and new work.

Messrs. Richardsons, Westgarth & Co. continue to be fairly busy with land work as well as marine work; good progress is being made with the oil engines for the cargo steamer building to the order of Messrs. Furness, Withy & Co.

Messrs. Smith's Dry Dock Co. continue busy in all departments, though nothing new is reported during the month. They expect one or two orders for small steamers that are in the market.

Messrs. Constantine, Pickering & Co. are reported as having placed four orders for steamers of about 5000 tons deadweight, one locally, one at the Hartlepools and at least one with Messrs. J. Blumer & Co., Sunderland.

On October the 17th the transporter bridge over the Tees was opened by H.R.H. Prince Arthur. This contract was let to Sir William Arrol & Co., Ltd., in June, 1909, to be built in twenty-seven months for £68,000. It is 850 ft. overall and 570 ft. between centres of towers across the river. Most of the works closed to celebrate the event.

Stockton and Thornaby.

Messrs. R. Ropner & Sons expect to secure an order for a cargo steamer that is in the market; they are only fairly well off for work.

Messrs. Richardson, Duck & Co. report nothing new during the month, although fairly busy, having a fair amount of work on hand.

Messrs. Craig, Taylor & Co. are reported as having secured an order for a cargo steamer, but nothing definite is known; they, however, continue to be fairly busy.

Messrs. Blair & Co., Ltd., are very busy and have booked one or two orders for local boats which will keep them busy for about nine months to come.

West Hartlepool.

Messrs. W. Gray & Co. continue to be as busy as ever. Quite recently they have booked an order from Messrs. Constantine & Pickering, of Middlesbrough, for a cargo steamer of about 5000 tons deadweight.

Messrs. Irvine's Shipbuilding and Dry Dock Co., Harbour Yard, continue very busy. Besides old work dry docking, etc., they have sufficient new work to keep them busy till Easter.

The Central Marine Engine Works of Messrs. W. Gray and Co. continue to be very busy. They are reported as having secured the contract for the machinery for Messrs. Constantine & Pickering & Co.'s boat building by them. They continue to be busy in their speciality department for drop forgings. The s.s. *Chicklade*, belonging to the Horsley Line, has been sold to British buyers

Hartlepool.

Messrs. Irvine's Shipbuilding and Dry Dock Co. are as busy as ever. There is nothing new to report during the month, but they have a good amount of work on hand which is expected to keep them busy up to midsummer. Orders for tramp steamers are [illegible] and as prices are getting firmer for the better class of steamer competition is very keen, very few shipbuilding firms being able to show a dividend of recent years.

Messrs. Richardsons, Westgarth & Co. are very busy. New work is scarce, but they have a good amount on hand, which should keep them busy for some months to come. They have a fair amount of condensing plant installations on hand, the contraflo system of condensation being fitted in every instance, very excellent results being obtained. They are also fairly busy in their extensive speciality department.

THE HUMBER AND DISTRICT.

(*From our Own Correspondent.*)

Messrs. Earle's Shipbuilding and Engineering Co., Ltd., are fairly busy with new work, and repairs on several Hull owned and other steamers, and their patent slips have been fully employed. The Company have been successful in obtaining the contract for two new steamers specially adapted for the ferry traffic between Hull and North Lincolnshire for the Great Central Railway Co. The vessels are to be of light draught, not exceeding 4 ft., which will, it is hoped, enable them to cross the Humber at all states of the tide regardless of sand banks, and will have nearly a flat bottom. Another feature is that they will have a rudder at both ends. The keels have been laid down and it is expected that they will be ready next spring.

Messrs. the Hull Central Dry Dock and Engineering Works, Ltd., have had to employ the use of outside dry docks for the following steamers undergoing heavy repairs and opening out boilers and machinery for Lloyd's surveyors, notably the s.s. *Empress*, which was picked up on the coast, being in distress through broken propeller shaft, etc., has been in graving dock and is now very near ready for sea again. S.s. *Star of Australia*, s.s. *Zillah*, s.s. *Farringford*, s.s. *Dessa*, s.s. *Snostad*, all dry docked. Other jobs include going under repairs s.s. *Dungeness*, s.s. *Blackfriargate*, s.s. *Fingall*, s.s. *New Pelton*. This Company is noted for the prompt manner in which they deal with breakdowns and temporary repairs, etc.; in this category may be placed the s.s. *T. G. Hutton*, s.s. *Gripfast* and s.s. *Lisette*.

Messrs. Stewart & Craig, engineers and boilermakers, have had a fair month of repairs, etc., including the s.s. *Ardenbearg* in graving dock, bottom sighted, cleaned and painted and new propeller fitted and other repairs; also s.s. *Fantoft*, new foremast fitted, new winch, lifeboat repairs, etc.; s.s. *Margetha*, new cylinders fitted on windlass and other numerous repairs.

Messrs. the North-East Coast Engineering Works, Ltd.—This firm has had the following steamers and tug boats in for repair during the month: S.s. *[illegible]*, s.s. *Lebanon* and s.s. *Hawthorn*; tugs *Winchester*, *Powerful* and *Chester*, and sailing-barque *Procyon*, deck repairs, etc. Work placed with this firm meets with quick despatch, as the works are well equipped to deal with all kinds of repairs to steamers.

Messrs. Woodall & Co., engineers and boilermakers, have been fully employed and have effected a number of repairs on local and other steamers in engine room and deck. The outside staff are fully engaged at the Corporation works on boilers and machinery repairs, and the smiths' shop is still busy on forgings for several railways and shipyards.

Messrs. Cooper & Co., Ltd., engineers and boilermakers are fairly busy with ship repairs, opening out boilers and machinery for Lloyd's survey and graving-dock repairs. The firm's own graving dock is fully employed with coasting steamers, etc., the boiler and moulding and pattern shops are fairly busy, and the branch repair shop at Alexandra Dock seems at all times to have a good share of work.

Goole Shipbuilding and Repairing Co., Ltd., keep fairly busy with repair and new work. Several steamers have come to grief in the Humber near Goole, and the Company expect to have some extra repairs.

Messrs. Amos & Smith, engineers and boilermakers, have

been successful in securing further new orders for boilers and machinery for trawlers, etc. The shop machines are working night and day to complete the numerous orders. The branch shop at Alexandra Dock is fully employed with dock and engine-room repairs and graving dock work.

Messrs. C. D. Holmes, Ltd., engineers and boilermakers, are still booking orders for boilers and machinery for trawlers and tugs for local and Grimsby owners, and the firm's patent steam winch for trawler work is a speciality in great demand. The branch shop at Alexandra Dock is well equipped to deal with all sorts of engine and graving dock repairs.

Fish Dock. The great amount of general repairs around this particular dock is well catered for; the patent slips and ways on the dock are owned by the North Eastern Railway Co., and are well employed in putting trawlers through Lloyd's annual survey.

Messrs. Cochrane & Sons, shipbuilders, Selby, are well booked ahead for trawlers, drifters, etc., and have to work overtime to cope with the amount of orders in hand for Grimsby and Hull owners. They are all built to Lloyd's requirements and rules. Two large trawlers launched last week were for Grimsby and Hull owners.

SOUTH OF ENGLAND AND ISLE OF WIGHT.

(*From our Own Correspondent.*)

Collision.—On the 5th of last month a collision occurred off the Isle of Wight. The full-rigged steel sailing ship, *Wiscombe Park*, of Liverpool, owned by Messrs. Chadwick, Wainwright & Co., was fast settling down when the tugs arrived. She had sustained serious damage amidships on the port side. The tugs towed the vessel inside the island and got their powerful pumps to work. Eventually the vessel was towed to Netley and put on the mud, and pumping operations continued. Later she was safely towed into the Inner Dock. The other vessel was the tramp steamer *Columbia*, of Cardiff, which received extensive damage to her bows. Fortunately the steamer struck the sailing vessel only a glancing blow, otherwise the latter must have sunk almost immediately.

The White Star Co.—The *Olympic* left Southampton on the 4th of last month for Belfast, after being temporarily repaired, and every effort will be made to complete the repairs as early as possible so as to allow the vessel to take up the sailing on November 29th. The sailings previously allotted to her will be taken by vessels of the American Line. The *Majestic* will complete two more voyages from Southampton before being removed to Liverpool to be placed on the Co.'s Canadian service, on which she will run in conjunction with the *Teutonic*. She is to undergo extensive alterations to the passenger accommodation for this trade, and will be transformed into a two-class vessel. The *Titanic* is scheduled to make her maiden voyage on the 10th of April next, and the summer service will be maintained by the *Titanic*, *Olympic* and *Oceanic*, meanwhile the sailings are being performed by the American and Atlantic Transport Line vessels.

Labour Dispute.—The steamer *Serbistan* arrived at Southampton about the middle of last month with a cargo of Persian barley and maize. The shore hands declined to unload the cargo unless they were paid an extra 3d. per hundred quarters on account of the alleged dirty nature of the cargo. At the time of writing the vessel was lying idle in the Inner Dock, but it was understood she would proceed to Weymouth to discharge.

Southampton Harbour Board.—It is announced that the Board of Trade enquiry into the constitution of the above board will be held at Southampton some time in November, the Board of Trade being represented by three Commissioners.

The Needles Lighthouse.—Mr. Parsons, the lighthouse keeper at the Needles, has retired after thirty-five years' service with the Trinity House authorities. As our readers will be aware, the lighthouse is situated on the outermost of the three large rocks at the western extremity of the island, and cannot be approached from the shore and only by water when the weather is fine. During bad weather in the Channel the lighthouse is cut off from all but telephone communication with the coastguards on the high cliffs above.

Messrs. Day, Summers & Co., Ltd., Northam Ironworks, Southampton. Several yachts have arrived at the yard and taken up mud berths for the winter, and last month several were slipped and painted, including the Isle of Wight steamers *Balmoral* and *Lorna Doone*. The cargo boat *G. Player* left the yard about the middle of last month after completion of extensive repairs occasioned by damage received on the coast of Guernsey at the end of August. Good progress is being made with a new 96-ft. tugboat, and also with the steamer for Liebig's Extract of Meat Co. The firm have recently booked several orders for iron castings and forgings, and are also carrying out a considerable amount of engine work on board the s.y.'s *Iolanda* and *Albion*. The s.y. *Cassandra*, 230 tons, built by the firm in 1890, has been purchased by an Italian naval officer, and made a remarkable voyage to Italy at the beginning of October, averaging 10 knots the whole way out in spite of continuous gales and heavy weather.

Messrs. J. Samuel White & Co., Ltd., East Cowes, Isle of Wight. The first of the Revenue cruisers for the Cuban Government left for Havana last month, and was reported "All well at Las Palmas." The second cruiser for this Government is launched and preparing for trials. H.M.S. *Ferret* has successfully completed her trials, and has been handed over to the authorities.

Messrs. J. I. Thornycroft & Co., Ltd., Woolston Works, Southampton. British Admiralty Work.—The following torpedo-boat destroyers are in hand: H.M.S. *Acheron* and H.M.S. *Ariel*. The former was dry docked last month, and will shortly be handed over to the Admiralty. The *Ariel* was launched on the 26th September, and is now preparing for trials. The shipment of further armoured motor patrol boats has been suspended during hostilities between Turkey and Italy. Two twin-screw tug boats for South America were launched last month and are now fitting out; also a small stern wheeler for the same destination, completed successful trials, and was shipped about the end of the month. New Orders.—The British Admiralty have placed an order with the firm for two steel paddle tugs, each of 690 tons. Orders have also been booked for two 60 ft. steel barges, an 80 ft. barge for the Crown Agents for the Colonies and a 55 ft. motor launch, in addition to several small jobs. Repair Work.—The repairs department have been busy during the month with work on troopships, yachts and cargo steamers.

THAMES.

(*From our Own Correspondent.*)

The Recent Dock Strike.—This matter has not ended without leaving some aftermath. We get it in the form of meetings of congratulation from the one side and for protection from the other, and in the meantime there has been a recurrence of a smaller strike at Deptford, which is now settled. The Sailors' and Firemen's Union have held their annual dinner, and satisfaction at the terms obtained was the keynote of the majority of the speeches. When we turn to the other side of the picture, we find manufacturers on the river binding themselves together more closely for their mutual interests to compensate for the altered conditions arising from the terms of settlement of the strike. As to the local disaffection at Deptford wharf, this was with the L. B. & S. C. Railway Co., the owners, as to payment for waiting time. However, as we have stated, the Company being firm, with minor concessions a settlement was happily effected.

Shipping Companies.—The P. & O. Co. will this month put into service their new 11,000-ton vessel the *Ballarat*, intended for only one class of passengers *via* the Cape to Australia. We chronicle the fact because it is a departure taken much advantage of by the emigrants who use this type of boat, and which bids fair to revolutionize the trade to this part of the world. The Company's steamer the *Medina*, to be used for the King and Queen's voyage to India, claims much attention at the present time. She has been handed over to the Admiralty since the early part of last month, and has been having alterations made at Portsmouth to fit her for her particular service. The *Orama*, the new 13,000-ton liner belonging to the Orient Co., is due to leave London on her maiden trip to Australia on the 10th inst. She is the first mail steamer in the Australian trade to be

[illegible] with a contribution of [illegible] engines and [illegible] and [illegible] Other improvements have been made during [illegible] in various directions.

Warship Building.—In view of the passing over of the Thames [illegible] attaches to the small [illegible] the present state of affairs. One meeting was held at Greenock Town Hall, presided over by the Mayor, when a resolution was passed expressing regret at the neglect of the Thames by the Admiralty. At the Lanchester Town Hall another gathering took place with the same objects in view. It is contended that the Thames should not be allowed, in the matter of shipbuilding, to fall into the back ground of Government orders because the men would be needed in war time and have to be kept for service. It is contended if practice is not afforded in peace time by the distribution of orders, when the opportunity arises. If it ever should do so there may not be the results to hand that there would be if adequate support were afforded now. This is the general burden of the arguments and it seems to contain sufficiently reasonable grounds for consideration.

St. Paul's Bridge. The matter has advanced a further stage and the County Council and Corporation are meeting with a view to settling the designs of tramways in the Deptford district so as to lead to a better point for the proposed bridge and approaches which the tramways will pass over. The scheme now seems to become a very large one.

MERSEY AND MANCHESTER SHIP CANAL.

(From our own Correspondent.)

Messrs. Cammell, Laird & Co. Great activity prevails in all the departments of this extensive yard and there is every prospect of a busy winter. Chief interest is centred at present in the large amount of Admiralty work both British and foreign. The destroyer *Lizard* was launched on October 11th by Mrs. Handley, wife of Major Handley, a director of Messrs. Cammell Laird & Co. Her sister ship the *Lassoo* is now receiving her machinery in the Wet Dock. This dock at present presents a very busy aspect. The Cunard liner *Carmania* is under the large crane undergoing turbine repairs, which it is expected will detain her for some weeks. Four Argentine destroyers are receiving their finishing touches, while the destroyers *Lizard* and *Lapwing* are also being outfitted alongside the Depot ship Cyclops. *Lizard* and *Lapwing* are nearing completion and present a very smart appearance. The cruiser and Dreadnought are fast advancing in their construction while the large floating dock for Portsmouth impresses one with its huge proportions as it advances towards completion. The last open Cunard steamer for the London and North Western Railway is being plated and all the work in connection with this boat is in advanced state. The large tug boat for the Port of London Authority will shortly be ready for launching. It is understood that an order has been secured for a small steamer launch which, with repairs, lighters and barges are keeping the small work department busy. The Death yacht *Eleanor* has now left after extensive repairs. Several important boiler contracts have recently been completed, amongst which may be mentioned the boiler uptakes fitted etc. for *Lusitania*, *Indomitable*, *Yorck* and *City of Belfast*. The two former being sub-contract.

Messrs. H. & C. Grayson.—This firm have been kept very busy with general repair work in their various yards having at times a staff of forty vessels in hand, the chief item of interest being the Cunard liner *Ivernia*. This vessel is expected will now be back at work after having had the forward part practically rebuilt and extensive bottom repairs. This work was accomplished in less than three months since she arrived from Queenstown.

White Star Line.—The *Zealandic* left Belfast for Glasgow on October 14th to have [illegible] of the company. [illegible] and gross tonnage [illegible] Belfast on October 4th and [illegible] The *Teutonic* is expected will [illegible] Southampton and Cherbourg to New York on April 10th next. The death took place recently of Mr. John Irvine Lester who was for many years with the White Star Line and was well known in shipping circles. Last month with this line's Cherbourg service it took over [illegible] engineering works at St. Joseph de Levis, Quebec. This [illegible] is 11 will be provided at high and 20 ft. at low water.

Manchester Ship Canal. The [illegible] canal have recently been [illegible] result of the recent strikes etc. An inspect was taken on October 4th upon the body of Mr. Henry Cunliffe [illegible] of the canal who was found to be [illegible] It is thought to be a result of a nervous breakdown. During the most serious [illegible] in the history of the canal occurred on October 5th at the Irlam Works [illegible] of the Anglo-American Oil Co. The oil contained [illegible] building which the fire [illegible] the canal was ablaze with floating oil. The fire [illegible] the Irlam and Manchester Fire Brigade [illegible] and at length subdued what might have been a disastrous conflagration. Some of the latter [illegible] and the paint blistered.

Mersey Dock and Harbour Board. The last week in September marked the completion of the first twelve months work on the new Gladstone Dock at the north end of the harbour. On January 4th the outer embankment was completed so as to shut out the tide. Some 90,000 cubic yards have been excavated to a depth of 30 ft. About two-thirds of the walls with their copings are finished. From the floor to the coping of the walls the depth will be 57 ft. In a few weeks' time the excavation of the dock itself will be begun. The entrance to the dock will be 100 ft. wide and the coping will have a depth of 45 ft. on a 30 ft. tide. The dock will serve as a dry or wet dock and will accommodate vessels of 1000 ft. in length. Some 250 men are constantly employed. The death occurred on October 7th of Mr. David Lewis who was for fourteen years a member of the board for six years of which he was chairman of the Finance Committee.

Birkenhead Ferries.—Mr. F. S. Legge has recently been appointed manager of these ferries out of 170 applicants. Mr. Legge has for some time acted as Ferries accountant and joined the ferries in 1878.

NORTH-WEST OF ENGLAND.

(From our own Correspondent.)

Barrow.—Very considerable activity is observable in the draughtsmen's departments of the works of Messrs. Vickers, Ltd., in the work of preparing estimates for British Admiralty orders which are to be given out to private builders, and they are also busy with other tendering and designing for ships of various types. Some time ago it was intimated that the Vickers' firm intended to go in for fast large commercial tonnage, and they have for some time past been tendering for some of the largest cross-Atlantic passenger craft that they are now so busy with Admiralty work to the home and foreign Governments, and have reason to hope that they may get further orders from the same quarter that they intend to go at the moment to go in for commercial tonnage. The yard of Messrs. Vickers [illegible] at present [illegible] than at any previous period in its existence, and there is a growth in the number of workmen [illegible] number of the week [illegible] and there is the certainty that [illegible] will be considerably increased. Nearly all the work proceeding at the moment [illegible] condition. There are therefore [illegible] on all jobs, which means certainly the employment of a larger number of men, but in many cases the necessity of overtime being worked.

Another Admiralty Order. The Vickers firm have received the order for one of the three destroyers put down last by the Admiralty. She will have 5,440 tons displacement and engines of [illegible] knots.

H.M.S. "Phœnix." [illegible] of the "Acorn" [illegible] speed and will be [illegible]

actuated by steam generated by means of oil fuel. No coal will be carried. She is now being fitted with her boilers and engines, and in the course of a few months she will be ready for her trials, which should prove interesting.

H.M.S. "Dartmouth."—This scout-cruiser, having finished her builder's trials with eminent success, and having had her engines opened out, left Barrow on the 17th ult. for her acceptance trials prior to going into commission.

The Chinese Cruiser.—The small Chinese cruiser built at Barrow is now ready for her trials, but whether she will be allowed to leave Barrow, seeing that a civil war is on foot in China, remains to be seen. At any rate no other Power is involved in the meantime. She is evidently destined to be a quick vessel, as her lines indicate celerity of movement, and especially so as her engine-power is known to be very adequate.

H.M.S. "Princess Royal."—The masts of this vessel have been stepped, and much advance has been made during the month in the internal fittings of the ship. Her boilers and engines are being fixed and several of her 13·5 guns have been mounted. By the end of the year, or in January next, it is expected she will be ready for her trials, notwithstanding the delay which occurred by the industrial unrest which has been experienced.

The Japanese Battleship-Cruiser.—Very little information is available as regards this huge vessel building at the Vickers' yard, owing to the strict secrecy which is enjoined by the Mikado's Government. The progress of her construction, however, is very rapid, and it can be seen week by week that considerable advance is being made. The engine-shops are very busy with her engines and boilers and auxiliary machinery, and particularly so now that the engines of H.M.S. *Lion* and H.M.S. *Princess Royal* are out of the shops.

Turkish Battleship.—This vessel, which has to be built and delivered in under two years, is already lifting her massive sides, and progress in her construction is assured by the arrival of material of all sorts ready for lifting to its place the moment it is required. There is quite an army of Turkish inspectors and others connected with this vessel in Barrow. Indeed, the town is now very largely full of Turks, Chinese, Japanese, Russians and others for whom the Vickers' firm is doing work. The chances are that other nationalities will soon be represented in Barrow, as it seems almost certain that a Chilian battleship will be built here. Much of the work in connection with a Russian battleship to be built in the Black Sea is being done at Barrow, the draughtsmen especially being very busy with this work.

Other Orders.—Considerable activity is evinced in the submarine department of Messrs. Vickers' works, and in the building of the huge Montreal floating dock, which is making great progress.

Engineering.—Apart from the engines of the Turkish and Japanese warships building at Barrow, orders are in hand for the engines of the Brazilian battleship building at Elswick, together with other marine work, and the gun-mounting department of the firm was never busier than it is now.

Dredging.—The work of improving the harbour of Barrow by deepening and broadening the channel out to deep water in the sea outside is proceeding satisfactorily. Several powerful dredgers are at work. The making of a deep-water berth in Walney Channel is also receiving attention. This, when completed, will enable a large vessel to ride in 30 ft. of water at the lowest tides.

Shipping.—The shipping trade is inactive, and exports of iron and steel are down 161,000 tons on the year.

BELFAST.

(From our Own Correspondent.)

Work in Progress.—According to Lloyd's returns for the quarter ended 30th September, there were twenty-four vessels, with an aggregate of 253,808 gross tonnage, under construction in Belfast. These figures speak for themselves as to the highly satisfactory condition of the shipbuilding trade on the Lagan. They constitute, in fact, a record for the port. Orders continue to be booked, and these, together with the new tonnage at present in hand, ensure a long period of prosperity.

Messrs. Harland & Wolff.—During the month of October the fitting out of the Union-Castle liner *Galway Castle* and the White Star liner *Zealandic* has been completed, and both vessels have sailed from Belfast to take up their respective stations. The *Galway Castle* is a twin-screw vessel 452 feet long, 56 feet beam, with a gross tonnage of about 8,000, and the *Zealandic* also twin-screw is 477 feet long, by 62 feet 9 inches beam, and also about 8,000 gross tonnage. The latter vessel has been constructed for the Company's Australian and New Zealand trade, which is run in conjunction with the Shaw, Savill & Albion Company. Within a few days of writing, the Queen's Island firm will launch from the south end of their yard one of the large steamers which they have under construction for the Royal Mail Steam Packet Company, whilst another vessel building at the north end is also nearing the launching stage. The *Olympic* duly arrived from Southampton and on Saturday, 7th October was docked in the new graving dock. Good progress has already been made with the repairs to the damage caused by the *Hawke*. The extensive alterations to the Royal Mail S. P. Co.'s *Ortona* which has been renamed *Arcadian* are also being pushed on rapidly.

Messrs. Workman, Clark & Co. have despatched the new fruit steamer *Carillo*, which was launched under the name *La Senora*. She is another addition to the large fleet built by them for the Tropical Fruit Steamship Co., and they have two similar vessels at the fitting-out wharves for the same Company. One of these, the *Sixaola*, will be ready for sea within a few days of writing. The *Carillo* is 379 feet long, by 50 feet beam, with a gross tonnage of 5,013. She is propelled by triple-expansion engines having cylinders 27 in., 45 in. and 75 in. by 54 in. stroke. In addition to these fruit steamers, they have the Shaw, Savill & Albion liner *Waimana*, launched on 12th September, fitting out. All their building berths are occupied with vessels of considerable size in various stages of construction, and they will shortly put in the water, one from the north yard and one from the south yard.

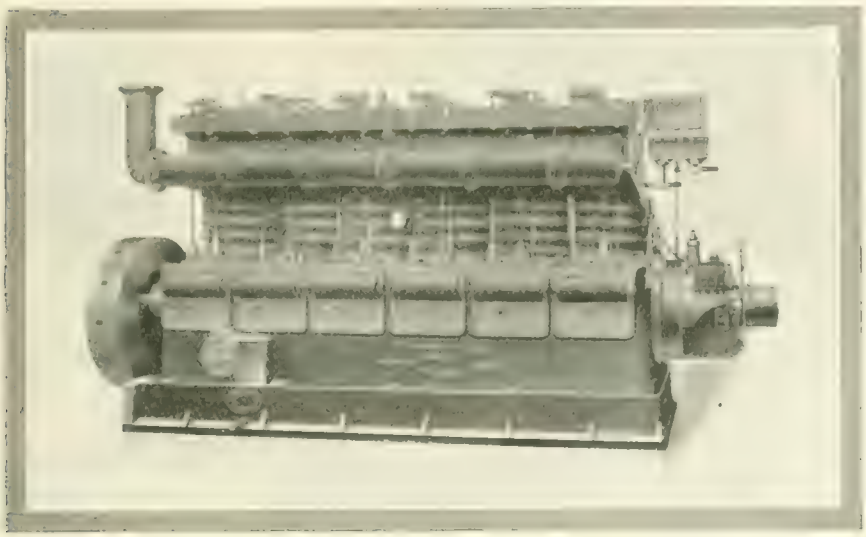
Messrs. MacColl & Co.—This firm recently completed the engining of the new twin-screw passenger steamer *Chelohsin*, which was built by the Dublin Dockyard Co. for the Union Steamship Co., of British Columbia, Ltd. The *Chelohsin*, which is the second vessel constructed by the Dublin builders, and the third engined by Messrs. MacColl & Co. for the same owners, is 175 feet long, by 35 feet beam, and 22 feet 6 inches to the awning deck. After a series of successful trials under various conditions the vessel sailed on her 14,000 mile voyage to Vancouver.

THE GAS-DRIVEN CARGO VESSEL "HOLZAPFEL I."

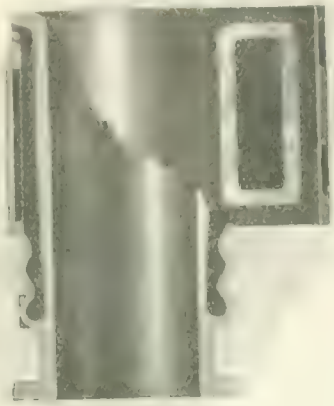
SINCE the trials of the *Holzapfel I.*, the first sea-going cargo vessel fitted with gas engines, an illustrated description of which was given in our March issue, very little news about the ship's performances and movements has come before the public. This arose from the fact that at first start off the vessel met with a collision, and various delays arising from the newness of the machinery on board and from the lack of familiarity of certified marine engineers with this type of machinery. Various adjustments of the machinery had also to be made before the vessel was able to do regular and satisfactory work. The owners naturally preferred to say nothing till they had some substantial facts to place before the public, which they are now able to do. The vessel has now carried the following cargoes:—Tyne to London, 242 tons of coke; London to Llanelly, 330 tons of scrap iron; Llanelly to London, 330 tons of lime; London to Cork, 330 tons of hardwood and cement; Cork to Newhaven, 251 tons of oats; Guernsey to London, 340 tons of granite; London to Tyne, 340 tons of chalk.

The voyages under notice have been performed by the vessel in a satisfactory manner, and the consumption of fuel has been most moderate, varying from 25 to 33 cwt. of coal per 24 hours, while other vessels of her size driven by steam engines consume more than double that quantity. Naturally, it was found on first starting off that many small improvements could be made in her machinery, many of these have already been completed, and the rest will now be done in the Tyne, where the vessel is undergoing a general overhaul at the Middle Docks, South Shields. The owners believe that by her past performances the *Holzapfel I.* has already established the practicability and economy of marine gas engines for sea-going vessels, and they have no doubt that, after the completion of the improvements now in hand, she will be able to compete very successfully against steam-driven vessels of her size in the coasting trade.

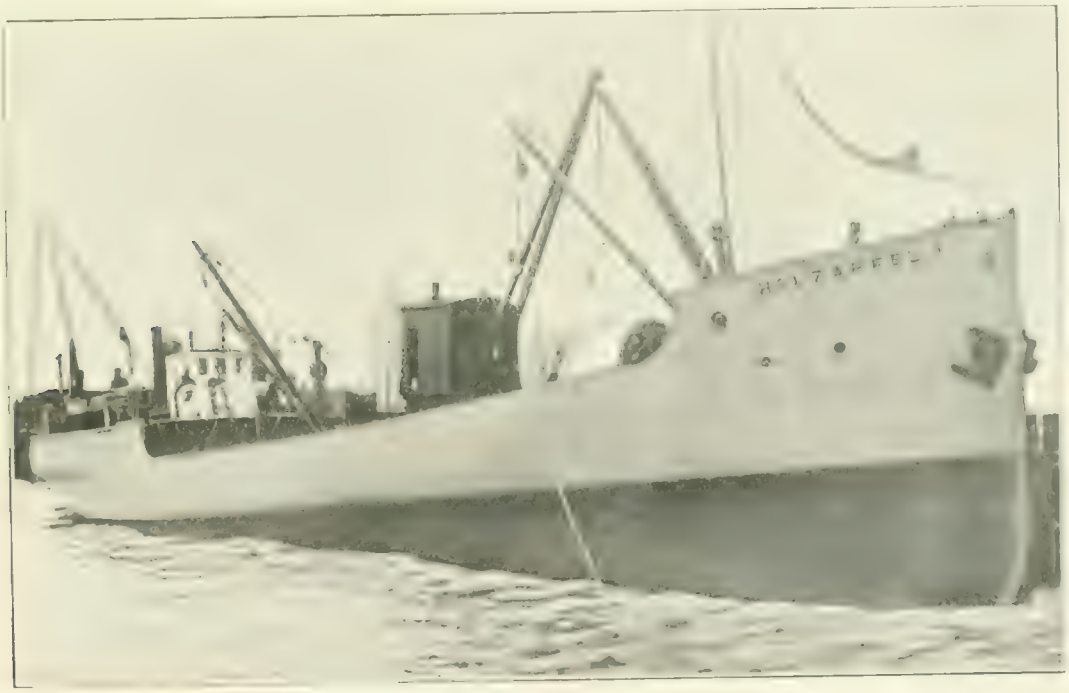
The transformer and gas engines are a complete success, and the owners see no difficulty in fitting vessels of almost any size with complete installations of gas plant, gas engines and hydraulic transformers, involving a very considerable saving in fuel as compared with steam engines of similar power. Plans have been completed in conjunction with the Power Gas Corporation of Stockton-on-Tees, for suitably



Type of Engine, by Messrs. E. S. Hindley & Sons, as fitted in the *Holzapfel I.*



Patent Cylinder Jacket, by Messrs. E. S. Hindley & Sons.



Gas-engined Vessel, *Holzapfel I.*, discharging at Blackwall.

installing on board cargo vessels of considerable size, gas plant consuming practically any class of coal and fitted with tar extractors, and in this connection the practical experience of the *Holzapfel I.* has been of utmost value. An illustration of the vessel discharging at Blackwall accompanies this article.

The Holzapfel Marine Gas Power Syndicate of 57, Fenchurch Street, London, E.C., will be pleased to give information and quotations to shipowners, shipbuilders and engineers, either for transformers alone or for complete installations of gas plant, gas engines and transformer according to the practical experience which they have had from the vessel's past performances.

In connection with this vessel a few words on the engines which have been supplied by Messrs. E. S. Hindley & Son, of Bourton, Dorset and London, may be of interest. The type of engine installed is of 180 h.p., has six cylinders, $10\frac{3}{4}$ ins. × 10 ins., running at 450 r.p.m., and is fitted with equilibrium throttle valve controlled by a crank-shaft governor contained in the extension of the crank case, similar to that used on the best high-speed steam engines. All the bearings are lubricated on the forced principle from a pressure pump, the oil being filtered each time it is returned to the oil well. A feature of the design of the Hindley engine is the jointless but expanding water jacket, which gives great freedom for expansion between the inner and outer cylinder wall, and at the same time leakage is impossible. This is an important feature and has been met with great favour by users of gas engines generally. The greatest consideration has been given to the design and details of the Hindley engine and it is very substantially built throughout. By the courtesy of Messrs. E. S. Hindley & Sons we are able to give illustrations of their engine and patent cylinder jacket.

MARINE MOTOR NOTES.

THE voyage of the *Toiler* to Halifax for service in Canadian waters has recorded an epoch in the history of the oil-engined vessel, after her preliminary coasting trials under the watchful care of the builders. The consumption of crude oil by the engines is stated to have been under two tons per day on the way out, and her behaviour on keen commercial service will be interesting to record. Messrs. Swan, Hunter & Wigham Richardson, Ltd., have a Diesel engine of 400 b.h.p. in hand as a result of the success attained by the *Toiler*, the engines of which were built by the Aktiebolaget Diesels Moterer of Stockholm, the vessel being built to the British Corporation Rules.

At the Scottish Exhibition held in Glasgow, there has been placed by the builders (Messrs. Barclay, Curle & Co.) a very interesting model, about 9 ft. long, of the *Jutlandia*, expected to run her trials this year. The exhaust fumes from the oil engines are to be discharged through the mizzen mast, a method which reminds one of the *Comet* and, by contrast, of the *Olympic*, one of the funnels of which serves as a ventilator. Besides the oil engines for driving the twin screws of the *Jutlandia*, another great point of interest will be the electrical power winches and deck machinery and the entire absence of steam. Messrs. Parsons (Southampton) have in hand, besides other work, sets of oil engines for the Admiralty, the boats for which are being built at Cowes and on the Leven. As formerly noted, several vessels are about to be placed on order, amongst these are one to Messrs. Vickers, Sons and Maxim, to be fitted with a type of Diesel engine associated with details of another well-known type, while the Leven and the Clyde are fortunate in having several vessels in hand and on order; Mr. Brock's 60-ft. yacht to be fitted with 80 b.h.p., also others about the same size. Lighters and barges fitted with oil motors are increasing around the coast, rivers and canals, as may be noted from the various port paragraphs, and it is interesting to observe that Messrs. Sulzer were among the pioneers in constructing oil engines for marine service. A cargo barge over 100 ft. long, which was built and fitted with a 45-h.p. oil engine fully six years ago, by Messrs. Sulzer, is running on the great Swiss lake economically. The order received by the Clyde Shipbuilding Co., Port Glasgow, on the south bank of the Clyde, for a vessel 320 ft. long to be fitted with oil engines of 1000 h.p., is another addition, not only to the number of vessels, but to the number of builders who have undertaken to pin their faith to the oil engine. In this case the type is to be that of Messrs. Carel Frères.

The discussions which have taken place at the Institute of Marine Engineers, inaugurated by the paper previously referred to, proved useful and instructive to the audiences, judging from the appreciative comments made. The points touched upon embraced the two-cycle *v.* four-cycle type; flexibility and reversibility; economy over steam; lubrication, classes of oil and possibility of oils not being up to sample, thereby causing deposits; the oil market being at the mercy of the unmerciful trusts or the soul-less corporation; the advantages of the coal gas engine as represented by *Holzapfel I.*, which Mr. Holzapfel pleaded was the most likely type to suit the British marine engineer. A number of lantern views added greatly to the value of the discussion, amongst these were the *Quivelly*, the French converted sailing vessel remarked upon in our previous notes, and the Beardmore oil engines, which were kept running on trial for some time prior to being fitted in the Marquis of Graham's yacht. The Swedish Diesel Motor Co. supplied an oil engine for the Polar expedition vessel *Fram*, formerly driven by steam, the saving in space and other conveniences having commended the change to Captain R. Admundson. The cargo vessels now in course of construction are to be fitted with different types of oil engines, Diesel, Bolinders, Carels Frères, and combinations of these, so that there will be a good prospect of discovering the most suitable for marine practice. In the return of vessels surveyed by the Government inspectors of New Zealand during 1910-11, exclusive of fourteen sailing vessels, appear the names of seventy vessels fitted with oil engines among a total of 354, or one-fifth of the whole. The largest engine is 120 b.h.p., and several are of 80 to 90 b.h.p. In his report Mr. Robert Duncan, the chief inspector, states, "The gas and oil engine and gas-producer engine seem to be displacing the steam engine, except where steam is required for manufacturing purposes. Most of the engines referred to are imported, and are sold at prices against which it would be impossible for firms in the Dominion to compete. This is not only a great monetary loss to the Dominion, but it also restricts the education of our young and rising engineers in the engineering trade, who miss the opportunity of seeing such machinery manufactured and handled while they are serving their apprenticeship. The gas engine has evidently come to stay as a cheap power, and in Great Britain and on the Continent of Europe the experiment is being tried of introducing this engine as motive power for the propulsion of ships."

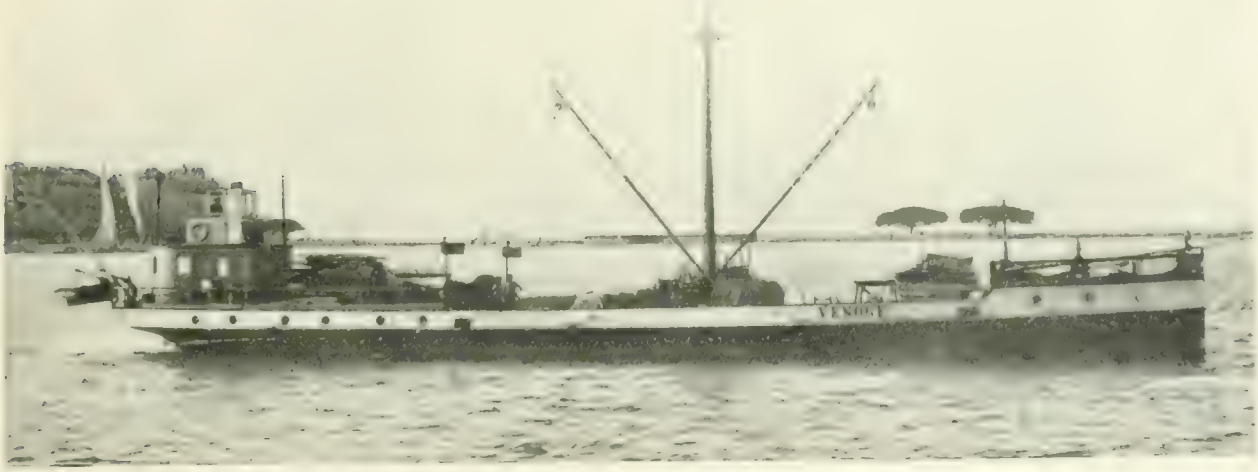
The price of Scotch shale oil has slightly advanced recently. This is not an undesirable point, as the market readily steadies and adjusts itself. The question of the original base of mineral oil was discussed at a meeting of the Institution of Mining and Metallurgy, when Mr. E. Costo read an interesting paper on the subject, projecting the view that the origin was more likely to be inorganic than organic matter composed of vegetable and animal. The coming months will probably have the effect of encouraging the building of some more large vessels, as those now in hand show themselves fit for economical duty. At present reliable data from all sources is not sufficiently public to judge results from, indeed the evidences in some respects are contradictory, and it complicates the question of how far it is safe to carry a guarantee, especially with the unfortunate case of a South African venture recently determined in the law courts. The London County Council is about to order another fire float fitted with oil motor propelling and pumping machinery, thus showing that the float built and engined for the Thames last year by Messrs. Thornycroft has given satisfaction. There are a few enquiries from the Continent under consideration by British firms, such may be taken as a compliment. Messrs. Beardmore

and Co. have secured orders during October for several engines, one set of 45 to 50 h.p. for crude oil, the vessel being built by Messrs. Cooper, Portsmouth, to the order of the Crown Agent for the Colonies. Messrs. Napier & Miller, Old Kilpatrick, have booked an order for an auxiliary vessel of 1,000 tons displacement, to be schooner rigged, and to have auxiliary power in the form of a gas engine and suction producer. This vessel is to be used for surveying purposes. The same firm have also to build a yacht of about 1,000 tons for Mr. Geoffrey Williams of St. Donat's Castle, South Wales, which is to be fitted with gas engines of 225 h.p. by Messrs. E. S. Hindley and Sons of Bourton, Dorset, and with gas producers by the Power Gas Corporation of Stockton-on-Tees. These orders constitute a class of work which will be watched with keen interest by all who are following the development of gas propulsion.

Messrs. Hindley have in hand an auxiliary schooner to be fitted with suction gas engines and plant, the reversing gear to be by Messrs. Dickinson & Browne, Guildford. The many oil-engined fishing boats now at and about Yarmouth are well in evidence and appear to be of good account. At a recent meeting of those who are interested in the proposed great canal from the Forth to the Clyde it was pointed out that some thirty to forty years ago the present canal from Grangemouth to the Clyde was one of the most remunerative undertakings in Scotland; the revenue decreased by undevelopment of the traffic. This has probably been repeated in the history of most of the canals in Britain and there is no reason why it should be so with a good and efficient service of motor-driven barges such as have been illustrated.

hands of the oil engine builders. With regard to the revolution speed of Diesel system motors, it appeared desirable to lose a little in propeller efficiency and have a higher revolution engine, as the lower speeds involved, to an extent, and in some circumstances not always preventable, tarry deposits on the piston. He quoted the advantages claimed by the M. A. N. Co. for the horizontal Diesel engine, but did not advocate this type for marine service.

A communication was read from Mr. Walter Pollock, who emphasized the importance of simplicity of design, handling arrangements and lubricating. He mentioned a case of a canal barge, carrying 30 tons, being fitted with a 15 B.H.P. Bolinders motor, doing the work in half the time at a cost of 3½d. per mile, as against the usual cost of 11d. per mile. This engine, he said, had the advantage of direct reversibility. Mr. F. M. Timpson said that most of the discredit attached to the marine motor industry was due to the fact that makers of engines for land work had constructed marine engines without a knowledge of marine conditions. He did not think horizontal engines would be considered for marine service. With regard to lubrication, for two-cycle engines in small vessels the cost was extremely low.



The *Venoge*, fitted with a 45 h.p. oil engine by Messrs. Sulzer Bros., for work on Lake Geneva.
(See Motor Number.)

OIL ENGINE PRACTICE.

FURTHER discussion took place on October 2nd, at the Institute of Marine Engineers, on Mr. E. Shackleton's paper, "Modern Developments in British and Continental Oil Engine Practice." Mr. Alexander Boyle (Vice-President), who presided, said it was a fact of the greatest importance to marine engineers that Diesel engines were in being, and had been constructed to take the place of steam engines in many sea-going ships, and he considered it highly necessary that marine engineers should have, not only a general knowledge, but an intimate knowledge of the details of such engines.

The author introduced the discussion by reading an addendum to his paper, in the course of which he said he considered the question of reliability of the new marine oil engines would have to be left largely in the

Mr. J. T. Milton said he disagreed very strongly with the author's opinion that engineers of large experience in the making of marine engines should have no voice in determining the different sizes of internal combustion engines, but should leave the matter to the makers of gas engines. The best results were obtained where marine engineers worked in co-operation with the makers of gas or oil engines. The vertical type of engine was undoubtedly superior to the horizontal for marine work. In the heavy horizontal engines the pistons could not be kept tight. He noticed that in describing a certain type of Diesel engine the words "the unavoidable residues of burnt lubricating oil in the cylinder" were used. For large marine engines, the presence of "unavoidable residues" would be a serious matter in long voyage ships. He did not think it quite correct, as stated by the author,

that a slower running engine necessarily involved tarry deposits on the cylinder. The claims of three distinct types of engine were now being generally considered; the 4-stroke cycle, the 2-stroke single-acting and the 2-stroke double acting. Without question the 4-stroke was the most economical, but that was only one consideration out of many. The 2-stroke single-acting was a cheaper engine, but the work of scavenging reduced its efficiency by about 10 per cent. The 2-stroke double-acting engine also had defects inherent in its constitution. Mr. Wm. McLaren referred to a Mirrlees Diesel engine on exhibition, giving a variation of four different classes of oil as fuel. He thought the time of 3 seconds given for reversing from full ahead to full astern was scarcely practicable. The 2-stroke engine, in his opinion, would be the most flexible.

Mr. D. Hulme said he failed to see how the 4-stroke engine could be more economical, when it had double the number of cylinders. Mr. F. Schubeler said it was easily possible to run marine Diesel engines dead slow at about one-seventh of their normal speed. In addition to other features, *viz.*, smaller cylinder, doing away with exhaust valves, etc., the main advantage of the 2-stroke cycle over the 4-stroke type was that the question of reversibility could be solved with simpler means.

In the course of a brief reply, Mr. Shackleton said the remark with reference to horizontal engines was made, but he certainly did not advocate putting a horizontal Diesel engine on board ship. In all oil engines there was a certain amount of residuum left behind. With regard to the general question of the internal combustion engine, one had to be guided principally by the makers, and the necessary experience was largely with the gas engine makers.

The discussion was adjourned until October 19th, when Mr. John McLaren (Vice-President) occupied the chair.

Mr. Shackleton opened by replying to some of the points raised at the previous meeting. He admitted that the present uncertainty as to a fuel oil standard was very unsatisfactory. The fuel economy of oil engines varied very much; in some cases it might be about 10 per cent., while in others it might be even 40 per cent. over steam engines.

Mr. R. W. A. Brewer said one disadvantage against the oil engine was that the price of liquid fuel was not governed by the laws of supply and demand, but was a purely artificial one, due to the fact that the supply was controlled by a very few large companies. Another point against it was the high initial cost, caused by the necessity for the very best workmanship and materials used in the construction of internal combustion engines of high pressures. The successful internal combustion engine for marine work would have to be an engine which followed the ordinary gas engine practice, in which the pressure was not so high, and would have to be on the 2-stroke cycle. One disadvantage of this type was that of carburation. Mr. P. A. Low pointed out that the Diesel engine did not carburate, so that the difficulty urged by the last speaker did not apply to it. In regard to the difficulty mentioned that the Diesel engine depended largely on the action of valves, he said this also was the case with the ordinary marine engine. Mr. A. C. Holzapfel said a disadvantage of the Diesel engine, or any reversible engine working direct on the propeller, was that when the propeller was lifted out of the water and racing took place, the action of the governor was reduced to such an extent that when the propeller dipped back again into the water the engine was apt to stop, and had to be restarted by compressed air. Gas engines, in his opinion, would be more suited to the necessities of British marine engineers than oil engines, which always had the great objection of the uncertainty of the price of fuel oil. He had had a gas engine running for 3½ or 4 months in a cargo vessel, working in all weathers, and it had given every satisfaction. Mr. L. W. Johnson said most of the fuel oils were supplied with a guarantee that they were free from an asphaltic basis, and so long as this was the case there was no danger of deposits on the pistons. With regard to the stopping of marine Diesel engines after racing had occurred, Messrs. Sulzer Bros. had a very ingenious device, which came into play under such conditions, and which practically eliminated such a possibility. The time occupied in reversing a 100 B.H.P. launch engine from low to full speed was 1½ seconds, and complete reversal from full speed ahead to astern was accomplished in 2 seconds.

Mr. F. Schubeler showed some lantern illustrations of various Diesel engines. He agreed that the price of fuel oil is getting cheaper rather than higher and that the supply was enormous. He admitted that great advances had been made in gas engine practice, but thought gas engines in general had several disadvantages for ship propulsion owing to the difficulties of combustion under small loads. Another drawback being pre-ignition and back-firing. He considered that the greatest inconvenience were the gas generators. The necessary adoption of auxiliaries diminished economy, and meant the reversal to conditions which the Diesel engine did away with entirely. Mr. Low also showed various lantern illustrations. Mr. F. M. Timpson showed an illustration of a 130 B.H.P. 2-stroke cycle crude oil engine on the semi-Diesel principle, which he described. Mr. W. McLaren said, with regard to the question of vibration, he understood the Diesel engine was a constant thrust engine. He presumed the clutch would not be considered for large powers in marine work. Marine engineers should remember that if an engine was very easily reversed it was easily stopped.

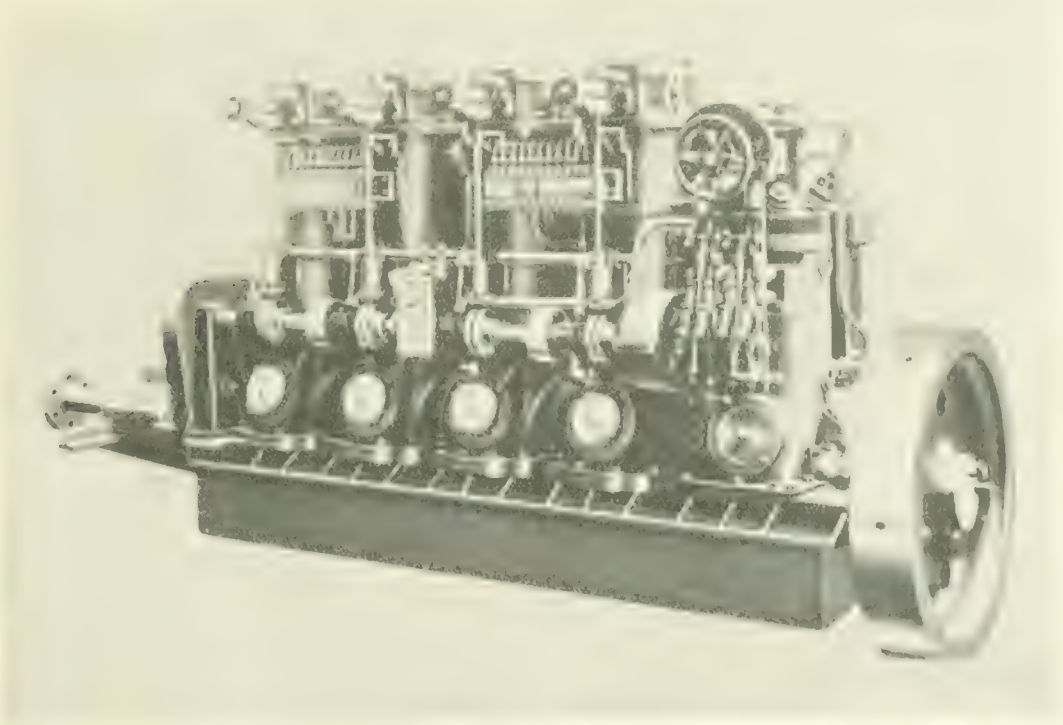
Mr. Shackleton, in the course of his reply, said the statement as to the reversing engine stopping under bad weather conditions had been often confuted. The engine was so governed as to prevent such an occurrence. The double-acting oil marine engine was adopted, as marine engineers would not accept an engine with a gudgeon, they insisted upon a crosshead. With regard to the question as to whether the gas engine makers were most competent to manufacture oil engines, he pointed out that the first builder of a Diesel engine was a maker of gas engines. He anticipated that the tendency would be for the prices of oil fuel to decrease rather than advance.

INTERNATIONAL SHIPPING AND OIL ENGINE EXHIBITION, NEWCASTLE.—We have been informed that arrangements have now been completed for transferring the Newcastle Exhibition of Marine Oil Engines and shipping from November, 1911, to March, 1912. This will permit engines to be shown running under their own power, a feature that makes an exhibition particularly valuable. The consent of all those who booked space for November has been obtained.

THE BEARDMORE OIL ENGINE.

A NON-STOP trial run of this engine of 130 b.h.p., for the Marquis of Graham's yacht, has been carried out at the Dalmuir Works, for 100 hours, to test its reliability and capacity. The oil used was Tarakan, with a specific gravity of ·95 at 60 Fah., the flash point being 200 and the calorific value 18,830 b.t.u.

This class of engine is made to suit the requirements of the various types of vessels, drifters, fishing boats, barges, pleasure boats, yachts, etc., and is designed accordingly with the number of units or cylinders calculated to be most serviceable and give the best results for the type. It has several features which are worthy of note and may be described. The system of vaporization admits of the engine using any kind of oil, and while running the change can be made from refined to crude oil by merely changing the supply tank cocks. The engine is on the low-pressure Diesel two-cycle system, and the compression takes place in the crank case. During the compression stroke, the piston forms a partial vacuum in the crank chamber; this opens the inlet valve which admits air. The piston is now compressing the charge of air from the previous stroke to a pressure of 150 lbs.; when the piston reaches the end of the stroke the pulverizer discharges a charge of oil and air at a pressure of 400 lbs., against the hot vaporizer, with the result that the ignition takes place and the power stroke is formed. The heat of compression and combustion maintains that of the vaporizer, while the engine is started at the outset by the blow lamp. On the downward path of the piston, on the power stroke, it uncovers the exhaust ports and the pressure gradually falls; at a later part of the stroke the air ports are uncovered and the compressed air from the crank chamber enters for scavenging purposes; this completes one cycle and is repeated as the engine works on its steady course. The oil is supplied from a set of pumps driven off the cam shaft; these are set and adjusted to deliver the requisite quantity to the pulverizer ready for each stroke. A governor of the centrifugal pressure controls the oil supply to the power requirements. The injection air for mingling with the oil at the pulverizer is kept at a uniform pressure of 400 lbs. by means of a two-stage compressor, which is driven from the main shaft by a separate crank. The pulverizer is constructed of a series of rings, and the oil with the injecting air in passing these becomes sprayed and readily vaporized as it passes into the cylinder timed by the cam shaft motion. The engine is started initially by compressed air stored in the engine room; its admission to the cylinder is by means of cams and levers specially fitted and when the purpose is accomplished these are readily thrown out of gear. The lubrication is effected by a combination of sight feed and an oil pump, the pipes being led to the various points for the efficient oiling of all the working parts.



The Beardmore Crude Oil Engine of 130 B.H.P. for the Marquis of Graham's Yacht.

[illegible] 12-h.p. "[illegible]" [illegible] Kuching river, Sarawak.

NEW P. AND O. LINER "MEDINA."

The King's Yacht *Pro Tem.*

THE New Peninsular and Oriental steamship *Medina* which, not long after her launch by Messrs. Caird & Co., Greenock, on March 15th last, was selected to convey the King and Queen in November to India, in pursuance of the State visit to the "Durbar" celebrations, left the Clyde on September 23rd, *en route* for Plymouth and Southampton, at which latter port she will be docked and receive internal furnishings, the fitting of which will be superintended from Buckingham Palace. With hull coated in white, set off with a broad blue and gold band along her upper works and with her two funnels and an extra pole-mast amidships, the huge vessel, 570 ft. in length, as she steamed about the Firth of Clyde on her preliminary trials, looked not at all the conventional "liner," but, with her fine sheer, accentuated by the gold strip, distinctly yacht-like. The illustration herewith is from a photograph taken while the vessel was adjusting compasses.

Selected for the high honour, and with modifications of one kind and another in her internal economy, the *Medina* is yet a sister ship to the *Maloja*, built by Messrs. Harland & Wolff, Belfast, which left the Thames on her first voyage on ordinary service on September 23rd, the same day as the *Medina* left the Clyde. The *Maloja* has accommodotion for over 450 first-class and 220 second-class passengers, and a crew—between Europeans and Lascars—of about 160. The *Medina*, on her Royal voyage, will carry an abnormal crew of navy men to the number of about 480. The general particulars of the *Maloja* essentially apply to her sister ship. They are the largest vessels in the P. and O. fleet and are the ninth and tenth of the "M" class. Their gross tonnage is 12,500, and fully loaded their displacement reaches about 20,000 tons. In length 570 ft. and breadth 62 ft. 9 ins., the vessels have seven steel decks, ten watertight bulkheads, and a double bottom extends right fore and aft, the depth and strength being increased under the engine-room, giving great rigidity to the structure. There are twin sets of engines on the quadruple-expansion principle and specially balanced. The arrangements for working ship and cargo are of the most approved kind, hydraulic power being employed to load and discharge cargo. The engines, cranes and other appliances have been fitted by Messrs. Brown Bros. & Co., Rosebank Iron Works, Edinburgh, and the pumping engine, of that firm's three-cylinder automatic compound type, is said to be the largest and most powerful of the kind ever installed on board ship for hydraulic power for cargo working. Of the ten cranes on board, six are of 3-ton capacity, two of 1-ton capacity, and the remaining two are luffing cranes. There are also four hydraulic bollards, each driven by a three-cylinder hydraulic engine, for working the boat falls. Steam is used for the powerful windlass forward and the steering gear aft, the latter being operated by telemotor from the bridge. Electricity for lighting and for ventilation is fitted throughout, the supply of fans and punkahs being very plentiful. The Marconi wireless telegraph system is installed.

HIGH-SPEED MOTOR BOAT "FELICITAS."

MESSRS. YARROW & CO., Ltd., Scotstoun, whose building stocks and works generally are well occupied with important contracts for torpedo destroyers and other naval units, are constantly engaged producing specialized craft in which high speed, shallow draught, or other knotty problems are involved. The firm have just completed the motor yacht *Felicitas*, built for Mr. Nicolas Mihanovich, junr., of Buenos Ayres, ordered by Mr. McKinnon of the same city. The speed attained as the mean of several runs on the Firth of Clyde by this little vessel—60 ft. long by 9 ft. beam—with a load of three tons on board, was 25·3 knots, this being 1·3 knots in excess of the contract speed. The propulsive machinery consists of five sets of Yarrow-Napier, four-cylinder, petrol motors, arranged to drive three propellers. The two wing propellers are each driven by two four-cylinder engines placed in tandem, while the central propeller is driven by a single four-cylinder engine. The reversing gear is fitted to the centre shaft only. A small cabin for the owner is fitted aft. The hull is built of steel, and the general design and construction of the vessel is similar to the motor-despatch boat, *Mercury II.*, which was built by the same firm for the British Admiralty, and in which it may be remembered the late King Edward and Queen Alexandra, with the King and Queen of Spain, went for a short trip during the Cowes Regatta Week a few years ago. The Yarrow firm, it is understood, have arranged to begin the manufacture of oil engines of the Diesel type, having improvements suggested by their own great experience of the conditions to be fulfilled in high-speed craft.

CHADBURN'S TELEGRAPHS ON THE "MEDINA."

WHEN this vessel was built for the P. and O. Company it was fitted with a telegraph on the wire and chain system that is in common use throughout the merchant service, but has been discarded by most of the Navies in favour of the rigid shaft system, which is much more reliable. When the *Medina* was chartered by the Admiralty it was decided to have a naval pattern telegraph, and Messrs. Chadburn were entrusted with the order. In the telegraph fitted, the instrument on the bridge has a wheel handle, which makes one revolution for each order. It is connected to the receiving dial in the engine room by hollow steel shafting and bevel wheels, the whole of the gear being supported by patent ball-bearing brackets. The special feature in these telegraphs is their reliability, and by an ingenious arrangement of gearing the pointers are made to jump from the centre of one order to the centre of the next, while the hand wheel travels through a small arc. During the remainder of the revolution of the hand wheel the pointer is locked in its mid-position, and a stop is arranged so that the hand wheel cannot be turned past the extreme order. Messrs. Chadburn also fitted the usual admiralty pattern rudder tell-tale, consisting of a ball and flag attached to the yard-arm, and worked by shafting and bevel gears from the rudder head.

Hyltonia.—On September [illegible], Messrs. [illegible] and Co. launched from their shipbuilding yard at Hylton the steamer *Hyltonia*. This vessel is a sister ship to the s.s. *M*[illegible], a type of vessel built after the Monitor patent. The owners claim that the *M*[illegible], which was launched two years ago, and which resembles the *Hyltonia*, the only vessel to which the Monitor patent has yet been applied, has proved an unqualified success. The owners of both vessels are the [illegible] Steamship Co., Ltd., of Newcastle-on-Tyne, and Messrs. [illegible] and Co. have built both ships. The *Hyltonia*'s leading dimensions are:—length [illegible] feet; breadth [illegible] feet; depth, [illegible] feet. She carries a deadweight cargo of [illegible] tons on a moderate draught. Designed for the cargo trade, she is a single-decked steamer with a poop, bridge and forecastle. She has four hatchways and her holds are absolutely clear. Water ballast is provided in the double bottom and in peak tanks at each end of the vessel, which, combined with the effect of the corrugations, makes the ship exceptionally safe and seaworthy and reduces friction and vibration to a minimum. Her saloon and state-rooms are provided in a commodious deckhouse amidships. The engineers and officers are comfortably berthed in side houses on the bridge. As in the case of the *M*[illegible], the engines will be put in by the North Eastern Marine Engineering Co., South Dock. The engines are triple-expansion, steamed by two large boilers working at a pressure of [illegible] lbs. [illegible] draught. The *Hyltonia* is classed to the British Corporation Registry. Messrs. Wailes Dove & Co.'s "Bitumastic" enamel has been applied to the bunkers and their "Bitumastic" covering to the tank top.

Cho-Sen Maru.—On September [illegible], there was launched [illegible] steel screw cargo steamer, which has been built to the order of Messrs. [illegible] on behalf of the [illegible] Kaisha, [illegible]. The principal dimensions of the vessel are:—length, [illegible] ft.; breadth, [illegible] ft.; and depth moulded, [illegible] ft. She is capable of carrying a deadweight of [illegible] tons on a moderate draught of water. The vessel has two complete steel decks and a poop, bridge and forecastle. The steamer has been built on the [illegible] system of framing to Lloyd's highest class under special survey. After the launch the steamer was towed to the works of the North Eastern Marine Engineering Co., at Wallsend, where she will be fitted with triple-expansion machinery, with cylinders [illegible] and [illegible] in. by [illegible] in. stroke, with steam supplied by two multitubular boilers [illegible] in. diameter by [illegible] long, working at a pressure of [illegible] lbs., and capable of propelling the vessel when laden at a speed of [illegible] knots.

Macedonia.—On [illegible] there was launched on the [illegible] the passenger steamer *Macedonia*, which has been built to the order of the National Steam Navigation Co. [illegible]. The vessel has been specially designed to meet the requirements of the passenger and emigrant service between Mediterranean and American ports. The principal dimensions are:—Length [illegible] ft.; breadth [illegible] ft.; depth to [illegible] deck [illegible] ft. Built of steel throughout, she will take the highest class at Lloyd's and British Corporation [illegible] with all the requirements of the British Board of Trade and [illegible] Italian and American [illegible] passenger and emigrants. The [illegible] passenger accommodation is very extensive, and excellently fitted up. It is entirely contained in two long ranges of [illegible] houses upon the shelter and promenade decks. [illegible] [illegible] with separate drawing-room [illegible] The third class [illegible] arranged [illegible] the best [illegible] [illegible] Greek church, the latter being of Gothic design, a dis-[illegible]

Drypool & Sutton.—On September [illegible], there were launched from the yard of Messrs. [illegible]

Selby, two steel screw trawlers, the principal dimensions being [illegible] ft. [illegible] in. by [illegible] ft. by [illegible] ft. [illegible] moulded. The vessels have been built to order of Messrs. [illegible] Steam Fishing Co., Ltd., of Hull, and will be complete with all the latest improvements for the fishing trade. They will be fitted with powerful triple-expansion engines by Messrs. Amos & Smith, Ltd., and Messrs. [illegible] and Co., Ltd., of Hull, respectively.

Transporter.—On September [illegible], the Blyth Shipbuilding and Dry Docks Co., Ltd., launched from their shipbuilding and repairing yard at Blyth the steel screw steamer *Transporter*, built to the order of the [illegible] Line, Ltd. (Messrs. [illegible] Ridley, Son and Tully, Newcastle-on-Tyne, managers). The vessel, which measures [illegible] ft. in length, with a beam of [illegible] ft. [illegible] in., has been constructed under Lloyd's special survey to their highest class. She is of the raised quarter-deck type, having poop, bridge and topgallant forecastle. The accommodation for the captain is in the bridge, and for the officers and engineers [illegible], whilst the crew will be berthed in the topgallant forecastle. The *Transporter* is specially adapted for the coal and wood trade, having specially large and unusually free and clear holds, together with the most and latest design of deck machinery for the rapid and economical handling of the cargo. Electric lighting installation will be fitted throughout the vessel by Messrs. [illegible] Bros., [illegible] Works, Ltd. Triple-expansion engines of good power will be supplied by Messrs. The North Eastern Marine Engineering Co., Ltd., of Sunderland.

Paignton.—On September [illegible], there was launched from the shipbuilding and repairing establishment of Messrs. S. P. Austin & Son, Ltd., the steel screw collier *Paignton*, classed 100 A1 at Lloyd's Register under special survey, to the order of Mr. Thomas Wilton, of Dartmouth. She is designed to carry about 3,100 tons deadweight on a light draught of water, including [illegible] water ballast capacity and large hatchways for self-trimming. Accommodation for captain and officers is fitted at the poop, engineers in houses on bridge deck, and crew in the forecastle. The machinery will be supplied by Messrs. John Dickinson & Sons, Ltd., steam winches and windlass by Clarke, Chapman & Co., Ltd., and steam steering gear by Donkin & Co.

Flicker.—On September [illegible], the Goole Shipbuilding and Repairing Co., Ltd., launched from their Victoria Shipyard a handsomely modelled steel screw [illegible] for Messrs. Kelsall Bros. & Beeching, Ltd., of Hull and Manchester. The following are the dimensions of the vessel:—[illegible] ft. B.P. by [illegible] ft. [illegible] in. by [illegible] ft. [illegible] in. depth moulded. She is constructed to carry about [illegible] tons of [illegible], and has two large trawling [illegible] in the fish hold, capable of holding [illegible]. The machinery has been built by Messrs. [illegible] Shipbuilding and Engineering Co., Ltd., of Hull. This is the [illegible] vessel which the Goole Shipbuilding and Repairing Co. have built for Mr. Beeching's firm.

Tafna.—On September [illegible], the steamer *Tafna*, built by Messrs. Wm. Doxford & Sons, Ltd., Sunderland, for Messrs. [illegible] Anglo-Algerian Steamship Co., Ltd. (Messrs. [illegible] Bowring & Co., Ltd.), [illegible]. The vessel is of the single-deck type. Length [illegible] breadth [illegible] ft. [illegible] moulded depth. [illegible] deadweight capacity [illegible] and the classification is with Lloyd's [illegible] Messrs. Doxford [illegible] engines and boilers [illegible] the [illegible] of Mr. W. [illegible]

Steel Screw Steamer.—On September [illegible], Messrs. [illegible] Co. launched from their [illegible] Walker [illegible] [illegible]

[illegible] with Howden's forced draught [illegible] vessel [illegible] specially constructed for the owners [illegible] the most modern arrangements for [illegible] cargo.

Goldenfels.—On September 22nd the large steel screw [illegible] was successfully launched from the Neptune [illegible] of Messrs. Swan, Hunter & Wigham Richardson [illegible] This vessel is being constructed to the order of the [illegible] Steamship Co. of Bremen and is the [illegible] vessel built [illegible] capacity of which no fewer than thirty have been [illegible] engined at the Neptune Works. The steamer [illegible] 458 ft. in length by 58 ft. beam and will carry [illegible] tons deadweight. She is being constructed to obtain the [illegible] in Lloyd's Registry, has teak decks and will be a fine example of an up-to-date cargo vessel. She will be equipped with electric lighting, together with a most complete installation of auxiliary machinery for loading and discharging cargo and for maneuvering the ship herself. The propelling machinery is also being supplied by Messrs. Swan, Hunter and Wigham Richardson, Ltd., at their Neptune Works, and will consist of a set of four crank quadruple-expansion engines, balanced on the Yarrow, Schlick and Tweedy system, and supplied with steam by three large boilers working under forced draught.

Dalewood.—On September 23rd, Messrs. Robert Thompson and Sons, Ltd., launched from their Southwick Yard a finely modelled self-trimming collier, built to the order of Messrs. Wm. France, Fenwick & Co., Ltd., of London and Sunderland. The vessel is of the raised quarter-deck and well-deck type, and will take the highest class at Lloyd's. Her principal dimensions are:—Length overall, 308 ft 9 in.; breadth, 42 ft 6 in.; depth moulded, 20 ft 0 in.; and she will carry about 3,500 tons deadweight on a light draught of water. She is fitted with bulb-angle framing, the holds being left clear of all obstructions for discharging with grabs. There are four very large hatchways arranged to make her perfectly up-to-date as a self-trimmer and to facilitate rapid loading and discharging. There is also a large shoot for discharging ashes overboard from the fiddley casing. Four powerful steam winches with latest improvements are supplied, with steam from a large vertical donkey boiler, and in addition to the usual derricks, four gaffs are fitted, the masts being strengthened for this purpose. To enable her to make quick return voyages ample water ballast is provided throughout the cellular double bottom and in fore and after peaks, the former being divided longitudinally and athwartships for trimming purposes and fitted with large tank suction pipes and extra large ballast donkey for quickly pumping out water ballast. The inside of holds, bunkers and engine and boiler-room tanks are coated with enamel. The mooring arrangements have also received special attention, steel wire compressors being fitted on the poop and forecastle decks, as well as the usual large fairleads and bitts. Accommodation for the captain and steward is provided in the poop, the saloon being tastefully fitted up in polished oak. Spacious rooms for the officers and engineers are arranged at the sides of the casings under the bridge deck, the petty officers and crew being berthed in the forecastle. At the forward end of the main bridge a steel house is arranged for the captain, with lower flying bridge on top, also teak chart house, the latter carrying the upper flying bridge. The engines, of the triple-expansion type, are by Messrs. The North-Eastern Marine Engineering Co., Ltd., Sunderland, having cylinders 22½ in., 37 in. and 61 in., with a stroke of 42 in., steam being supplied by two extra large boilers working at 180 lbs. pressure. During construction the vessel and her machinery have been under the personal supervision of Messrs. Thompson, Eyres and Bryers, of Sunderland. A Cochran (Annan) Donkey Boiler with Patent Seamless Furnace has been supplied and fitted.

Wimborne.—On September 23rd, Messrs. Craig, Taylor and Co., Ltd., launched from their Thornaby Shipbuilding Yard, Thornaby-on-Tees, a very fine screw steamer of the following dimensions, viz.:—[illegible] 430 ft. by 53 ft. 6 in. by 30 ft. 7½ in., moulded to bridge deck. She is built of steel on the single-deck type, with poop, long bridge and topgallant forecastle to Lloyd's highest class, but has in addition to same increased scantlings to the owners' special requirements. She has large water ballast capacity in double bottom fore and aft, and in peaks, and is equipped with patent direct steam windlass with quick-warping ends, steam-steering gear, large multitubular donkey boiler, six special steam winches, double derricks, very large hatches and all the latest improvements for rapid loading and discharging. The masts and funnel have been arranged to suit Manchester Ship Canal requirements. Shifting boards are fitted throughout for the carriage of grain cargoes and all has been arranged to a complete and full specification. The accommodation for captain, spare rooms and officers is neatly fitted up in deck houses amidships on bridge, the engineers being in deck houses alongside engine casing, and the crew in the poop with special mess rooms, bath rooms, etc. The whole accommodation has been arranged on a very ample scale, giving each compartment extra large cubic and floor space. Her engines have been constructed by Messrs. Blair & Co., Ltd., Stockton, the cylinders being 28 in., 46 in., 75 in. by 48 in. stroke, with three large boilers working at 180 lbs. pressure. The vessel has been built to the order of Messrs. Evan Thomas Radcliffe and Co., Cardiff, under the superintendence of Captain Hesketh, Mr. Maxwell Hill and Mr. James. It is interesting to note that this vessel is the longest and we understand the largest vessel that has yet been built at Stockton.

Acajutla.—On September 25th, there was launched from the Neptune Shipyard, Newcastle-on-Tyne, of Messrs. Swan Hunter & Wigham Richardson, Ltd., a steel screw steamer which they are building to the order of the Salvador Railway Co., Ltd., London, intended for their Central American service. The steamer which is named *Acajutla* is a handsome vessel with clipper bow. She is 225 ft. in length by 33½ ft. beam, is built to attain the highest class in Lloyd's Register, and will have a Board of Trade passenger certificate. Well-furnished accommodation is to be provided for twenty-four first-class passengers. The finest of coffee comes from Salvador, and the *Acajutla* is well fitted and ventilated for carrying it. She has electric light and fans, refrigerating machine and every requisite for service in a hot climate. The propelling machinery will consist of a set of triple-expansion engines, which, together with the boilers, are being constructed by Messrs. Swan, Hunter & Wigham Richardson, Ltd., at their Neptune Works. The *Acajutla* is practically a sister vessel to the *Salvador* built two years ago by Messrs. Swan, Hunter & Wigham Richardson, Ltd. That vessel made her long run of 12,500 knots out to Salvador without a stop, and has since made a name for herself for the regularity of her passages on the coast. Messrs. Swan, Hunter and Wigham Richardson, Ltd., have a third vessel in hand for the Salvador Railway Co.

Turkistan.—On September 25th, Messrs. William Gray and Co., Ltd., launched the large steel screw steamer *Turkistan*, which they have built for Messrs. Frank C. Strick & Co., Ltd., of Swansea and London. The vessel will take the highest class in Lloyd's Register and is of the following dimensions, *viz.*:—Length overall, 384 ft. 6 in.; breadth, 50 ft. and depth, 30 ft. She is a handsomely modelled vessel of the double-deck type with poop, long bridge and topgallant forecastle, having very tasteful cabin accommodation in houses on the bridge deck for passengers, captain and officers and is fitted throughout with electric lighting. The vessel has a cellular double bottom and after-peak tank for water ballast, and in addition there is a deep tank or hold compartment fitted for water ballast abaft the engine-room giving a total capacity for water ballast of about 2,000 tons. The whole of the outfit, including steam windlass, steam-steering gear, ten steam winches, with return exhaust to winch condenser of the contraflo type, is of the most approved description. The machinery is made by the Central Marine Engine Works of the builders, being of the triple-expansion type with cylinders 28 in., 46 in. and 77 in. diameter, with a piston stroke of 48 in. She is fitted with a contraflo main condenser, Weir's feed pumps and heater and large steel multitubular boilers working by Howden's forced draught at a pressure of 180 lbs. per square inch. The vessel and machinery have been constructed under the superintendence of Mr. Archibald Walker on behalf of the owners.

Cento.—On September 26th a steel steamer of about 3,699 tons gross, named *Cento*, was launched at Sunderland. Owners, Messrs. R. Nicholson & Sons. Port of Registry, Liverpool.

Montebello.—On September 27th there was launched from the yard of Earle's Shipbuilding and Engineering Co., Ltd., Hull, the finely modelled steel screw steamer *Montebello*. The ship has been built to the order of Messrs. Thos. Wilson Sons & Co., Ltd., Hull, and is intended for the Bombay trade

the principal dimensions being: Length, [illegible] ft.; breadth, 50 ft. 3 in. moulded; depth, 29 ft. 7 in. moulded. The vessel has been constructed of steel to Lloyd's highest class and Board of Trade latest requirements, and is fitted for carrying a large quantity of water ballast in the cellular [illegible] and aft-peak tank. She is a well-decked ship and has a long poop, bridge and forecastle deck, two steel pole masts and two steel derrick posts which are very efficient appliances for the speedy handling of cargo, the derricks being capable of dealing with heavy lifts, and worked by eight powerful steam winches of the most approved description; also a large steam windlass is fitted on the forecastle deck. The steering engine is placed in house in poop, and is worked by the telemotor system from the navigating bridge; powerful hand-screw gear is also fitted in the poop aft. A large deck-house is provided at the fore end of bridge deck for the accommodation of captain and officers, with captain's chart room situated near the navigating bridge, the engineers and petty officers are berthed in side houses abreast the engine casing at aft end of bridge deck, the [illegible] and firemen's accommodation being in the forecastle. The ship will be fitted up with electric light installation, the saloon, officers' and engineers' living rooms are all heated by steam, and the work throughout the vessel is of the very best description with the latest improvements. Triple-expansion engines constructed by the builders have been fitted, having cylinders 25 in., 41 in. [illegible] in. by 33 in. stroke, supplied with steam by three large steel boilers working at 180 lbs.

Alizarine.—On October 6th, Messrs. William Dobson and Co. launched from their shipbuilding works at Walker the small steamer *Alizarine*, which they have built to the order of Messrs. Burt, Boulton & Haywood of London, for carrying oil in bulk. The dimensions of the vessel are [illegible] ft. by 28 ft. by 10 ft. 6 in. The hold is divided into six separate compartments for oil cargo, and there is a complete system of heating pipes for [illegible] carrying [illegible]. The machinery is being constructed by Messrs. MacColl & Pollock, Ltd., of Sunderland. The cylinders are 22 in., 38 in. and 63 in. diameter and 18 in. stroke.

Annan Maru. On October 6th there was launched on the Tyne the second of two steel screw cargo steamers which have been ordered on behalf of the Osaka Shosen Kaisha, of Osaka, Japan. The vessel is built on the longitudinal system of framing to Lloyd's highest class under special survey, and is of the following dimensions:—Length, [illegible] ft.; breadth, 44 ft.; depth moulded, 27 ft. 3 in.; and is capable of carrying a deadweight of 5,000 tons on a moderate draught of water. The vessel has two complete steel decks, a poop, bridge and forecastle. After the launch the steamer was taken to the works of the North-Eastern Marine Engineering Co., Ltd., at Wallsend, where she will be fitted with triple-expansion machinery having cylinders 22 in., 37 in. and 61 in. by 42 in. stroke, taking steam from two multitubular boilers 13 ft. 6 in. in diameter by 11 ft. 6 in. long, working at a pressure of 200 lbs. per square inch. The vessel will have a speed, when loaded, of 10 knots. After the launch, Captain Chuma said that this was the ninety-second steamer owned by the Osaka Company, and he believed that the new sister ship the *Chikuzen Maru* would give a good account of herself and every satisfaction to her owners.

Detmold. On October 6th there was launched at the Wear the large steel screw steamer *Detmold*, which has been built to the order of the Lodiana Steamship Co., Ltd., of Newcastle, of which Mr. Wm. Hedley is the managing owner. The vessel is of the [illegible] deck type, with long bridge and forecastle, and has been designed to carry a deadweight of about 7,700 tons upon a moderate draught. Her principal dimensions are:—Length, 385 ft.; breadth, extreme [illegible] in.; depth, moulded, 29 ft. 1½ in. She has been built under special survey to Lloyd's highest class, and to the Board of Trade requirements for carrying grain cargoes in bulk. Provision is made for water ballast in double bottom throughout and in after peak. The propelling machinery consists of a [illegible] triple-expansion engine, having cylinders 25 in., [illegible] and [illegible] in. in diameter, stroke [illegible] in., 34 in., 3 in. [illegible] by 42 in., and a working pressure of 180 lbs. per square inch. During construction the vessel has been under the personal supervision of Mr. Geo. Holzapfel, Mr. R. J. Marshall (the owners' superintendent), and Captain Walker, who will take command.

Cairngowan. On October 6th, the steel, twin screw steamer, built by Messrs. Wm. Doxford & Sons, Ltd., Sunderland, to the order of the Cairn Line of Steamships, Ltd., Messrs. Cairns, Noble & Co., Newcastle, was launched. The principal dimensions of the vessel are: Length between perpendiculars, [illegible] ft.; breadth, [illegible] ft.; and [illegible] ft. moulded depth. The vessel is equipped with [illegible] and is being constructed to the British Corporation Survey. Messrs. Doxford are supplying the engines and boilers. Mr. C. Walbe Cairns, Ltd., superintended the construction of the vessel, assisted by Capt. Gibson. Messrs. Wailes, Dove and Co.'s "Bituminite" coating has been applied to the boiler-room tank and bilge [illegible] in the boilers, etc.

Steamer for Northern Commercial Syndicate.—On October 7th there was launched from the yard of the Lake Iron Shipbuilding Co., Ltd., of Wallsend-on-Tyne, a steel screw steamer built for Messrs. The Northern Commercial Syndicate, Ltd., R. M. Sutton, manager, Blackfriars Buildings, Newcastle-on-Tyne, and of the following dimensions, viz.: Length about 342 ft.; breadth, [illegible] ft. [illegible] in.; depth moulded, 25 ft. 7 in.; and to class [illegible] at Lloyd's on the single-deck rule. This vessel has water ballast arranged right fore and aft on the cellular system and is also fitted with all modern improvements for the rapid loading and discharging of cargo, including five double cylindered steam winches [illegible], steam windlass, large multitubular donkey boiler, steam-steering gear by Messrs. Donkin & Co., and screw gear aft. The engines, which are supplied by Messrs. The North-Eastern Marine Engineering Co., Ltd., of Wallsend, are of the triple-expansion type, having cylinders 24 in., 40 in. and 65 in. by 42 in. stroke, with two large single-ended boilers and working at a pressure of 180 lbs.

Abbas.—On October 7th, Messrs. S. P. Austin & Son, Ltd., launched from their shipbuilding and repairing establishment at the Wear Dockyard, Sunderland, the steel screw steamer *Abbas*, to be classed [illegible] at Lloyd's Register under special survey, and built to the order of Messrs. Stephenson, Clarke & Co., of London, this being the eighth vessel constructed by them for the same owners. She is designed to carry about 2,[illegible] tons deadweight on a light draught of water and is fitted with large hatchways specially adapted for the owners' coal trade. The machinery placed aft was supplied by Messrs. John Dickinson & Sons, Ltd., of deck machinery, including four steam winches, steam windlass and steam capstan by Messrs. Clarke, Chapman & Co., Ltd., steam-steering gear by Messrs. Donkin & Co., and steam will be supplied for these from a Cochran (Annan) vertical multitubular donkey boiler with patent seamless furnace. The construction of the vessel has been superintended by Mr. T. S. Hunter on behalf of the owners.

LAUNCHES—Scotch.

Hurunui.—On September 25th, there was launched at Port Glasgow the steel screw steamer *Hurunui* for The New Zealand Shipping Co., Ltd. Her dimensions are:—Length, [illegible] ft.; breadth, 52 ft. 6 in.; [illegible] with a deadweight carrying capacity of 9,000 tons. The steamer has been specially designed for the passenger and cargo trade of the Company between New Zealand and London. Insulating machinery for the carrying of frozen meat has been fitted. She will have accommodation for a number of first-class passengers. Built to Lloyd's highest class and to Board of Trade demands, the vessel will be supplied with machinery at Glasgow.

Fluent. On September 27th there was launched at Sunderland the large steel screw steamer *Fluent*, being the latest addition to the fleet of Mr. James Westoll, Sunderland. The vessel has been constructed in Lloyd's highest class, and is of the single-deck type, with clear hold [illegible] and long combined poop and bridge and topgallant forecastle. The dimensions are: Length [illegible] depth moulded, 26 ft. Triple-expansion engines will be supplied by the North-Eastern Marine Engineering Co., Ltd., Wallsend, [illegible] and 67 in., with a stroke of 45 in. Steam is supplied by three large boilers working at [illegible].

Baroda. Messrs. Harding, Gould & Co., Westminster, recently launched the single screw steamer *Baroda*, which they have built for the Peninsular Steam Navigation Co. The vessel is [illegible] ft. in length, [illegible] ft. in breadth, and [illegible] ft. in depth, and is of [illegible] tons.

Sculptor.—Messrs. Charles Connell & Co., Ltd., Scotstoun,

recently launched the steel screw steamer *Sandra*, which they have built to the order of Messrs. J. A. J. Harrison, Liverpool. She has been built to Lloyd's highest class and is fitted with all the latest requirements for the rapid and efficient working of cargo. Triple expansion engines, with all the latest improvements, are being supplied by Messrs. Dunsford & Jackson, Ltd., Govan. Messrs. Matthew Keenan and Co., Ltd., have completed the contract to cover the boilers and steam pipes on board.

Tyne.—Messrs. Fleming & Ferguson, Paisley, have recently launched the bucket dredger *Tyne*, which they have built to the order of the Tyne Improvement Commission, Newcastle. The vessel is designed for dredging close up to quay walls, and the buckets are of specially strong construction for lifting rock, etc. The dredger, which is to be used in connection with the improvements now being carried out on the river Tyne, will be capable of raising 80 tons per hour from a depth of 45 ft.

Two Trawlers.—Messrs. Hall, Russell & Co., Aberdeen, recently launched two trawlers, one for the Peterhead Trawling Co. and the other for the Standard Steam Fishing Co., Aberdeen. The dimensions of the Peterhead vessel are: Length, 117 ft., breadth, 22 ft., depth, 13 ft. The Standard Co.'s vessel is 115 ft. by 22 ft. by 13 ft. Boilers and engines for each vessel are being supplied by the builders.

Media. On October 5th, there was launched from the yard of Messrs. Alex. Stephen & Sons, Ltd., Linthouse, the second of two large steamers they have built for the Indian service of the Anchor Line (Henderson Brothers), Ltd. Like her sister ship the *Anchoria*, which was delivered last month, the vessel has been constructed to the highest requirements of the British Corporation, and her dimensions are 420 ft. by 53 ft. by 33 ft. In addition to having a large cargo-carrying capacity, accommodation has been provided for a number of passengers. Her equipment for dealing with cargo is also very ample, and of efficient design. The propelling machinery, which has also been provided by the builders, consists of triple-expansion engines having cylinders 28 in., 46 in. and 77 in. by 51 in. stroke, and three large double-ended boilers with a full equipment of auxiliary machinery.

Sanda.—On October 10th, there was launched at Dundee a steamer which has been built for the Clyde Shipping Co. The vessel, which was named *Sanda*, is of the following dimensions:—Length overall, 259 ft.; breadth, 35 ft.; depth, 17 ft. 8 in. She is of 1,200 gross tons. The machinery consists of triple-expansion engines, having cylinders 20 in., 33 in. and 53 in. by 39 in. stroke. The vessel is intended for the Company's Irish trade. A Cochran (Annan) Donkey Boiler with Patent Seamless Furnace has been supplied and fitted.

Opouri.—On October 10th, there was launched at Paisley a steamer of 600 tons deadweight capacity, which has been built to the order of Messrs. Reece Brothers, Lyttelton, N.Z., for their coal and timber trade to and from Australia. Triple-expansion engines of 700 i.h.p. are being supplied. The steamer was named *Opouri* by Miss Orr, Wellington, N.Z.

TRIAL TRIPS.

La Senora.—On September 5th, this vessel left the Alexandra Wharf and steamed down Belfast Lough for adjustment of compasses, and to undergo her speed and general machinery trials, and under all conditions gave the utmost satisfaction, an average speed in excess of the contract requirements being attained. See Launches, June.

Vandyck.—The new twin screw steamer *Vandyck*, built and engined by Messrs. Workman, Clark & Co., Ltd., Belfast, together with her sister vessels *Vauban* and *Vestris*, at present in course of construction by the above firm, have been specially designed for the British and South American service of the Liverpool, Brazil and River Plate Steam Navigation Co., Ltd. (Messrs. Lamport & Holt, Liverpool, managers). The principal dimensions of the *Vandyck* are: Length, 511 feet; beam, 61 ft.; tonnage about 10,000, and the construction of the vessel has been carried out to the requirements of the highest class in the British Corporation Registry of Shipping. She has six decks. The vessel is propelled by twin screws driven by two independent sets of quadruple expansion engines balanced on the Schlick-Tweedy principle, by which vibration is practically eliminated. In the passenger accommodation the closest attention has been given to securing the utmost comfort for the first and second class passengers, while the spaces reserved for emigrants are well adapted for this class of passengers. She will carry 250 first-class passengers. On September 8th the *Vandyck* left Belfast and proceeded to the Clyde where speed trials were run on the measured mile, these being highly satisfactory, a speed in excess of the contract having been attained. Afterwards the vessel proceeded to Liverpool. See Launches, July.

Maloja.—On September 9th, this fine large twin screw steamer, built by Messrs. Harland & Wolff, Ltd., for the Peninsular & Oriental Steam Navigation Co., left Belfast after adjustment of compasses and successful trials, and proceeded to London, from whence she will sail on her first voyage to the East on the 23rd September. The *Maloja* is a passenger and mail steamer of the highest class, of the distinctive P. & O. type, and a splendid example of British shipbuilding. The new vessel is 569 ft. long by 62 ft. 9 in. beam, with a gross tonnage of 12,500, and constructed on the latest and most approved practice. She has two steel pole masts and two funnels, ten watertight bulkheads carried up to the spar deck, seven steel decks, and the double bottom extends right fore and aft, the depth and strength being increased under the engine room, giving great rigidity to the structure. The *Maloja* has accommodation for over 450 first-class and about 220 second-class passengers, and, needless to say, the various public rooms, also the staterooms, are furnished and decorated in a style well in keeping with the traditions of this famous line. The first-class dining saloon on the spar deck extends the full breadth of the ship and will seat about 320 people. Special attention has been given in the ship to the ventilation both natural and mechanical, and in the public rooms as also the staterooms it will be found that the arrangements for the comfort of passengers have been carefully devised. The supply of fans and punkahs throughout the accommodation is very liberal. The arrangements for working ship and cargo are of the most approved type, including ten hydraulic cranes, anchor crane and steam windlass. The steering gear is of the builders' well known make, and capable of being worked by telemotor from flying bridge. The vessel has large insulated cargo holds. She is fitted throughout with electric light, and provided with an installation of wireless telegraphy, the Marconi house being on the promenade deck above the officers' quarters. The *Maloja* has two sets of quadruple expansion engines arranged on the "balanced" principle, also constructed by Messrs. Harland & Wolff, Ltd. The McNab (British) Indicator Co., Ltd., have supplied, for use on board, their marine register and indicator for recording on the bridge or elsewhere, the actual engine movements. Messrs. Matthew, Keenan & Co., Ltd., have applied their patent non-conducting composition to the boilers and steam pipes, and they have packed the casings of the engine and boiler rooms with their patent bulkhead lining.

Den of Airlie.—The loaded trials of the new steamer *Den of Airlie* on the measured mile have been carried out with satisfaction, and the vessel has left for New York on her maiden trip. She was built at Port Glasgow, for Dundee owners. See Launches, August.

Clan Macgillivray.—The steel screw steamer *Clan Macgillivray*, built at Walker-on-Tyne, for Messrs. Cayzer Irvine & Co., of Glasgow, has been taken to sea for her trials. The vessel made a number of runs on the measured mile, and attained a mean speed of 14½ knots. After the trial she proceeded to Middlesbrough to load cargo. The *Clan Macgillivray* is a large shelter deck single screw steamer 430 ft. long, 53 ft. 6 in. beam, and 29 ft. depth moulded to upper deck. The propelling machinery is of the triple expansion type manufactured by the Wallsend Slipway and Engineering Co., Ltd., and has cylinders 29, 49, and 80 in. by 60 in. stroke, steam being supplied by three boilers 16 ft. 4 in. diameter by 11 ft. 9 in. long working under forced draught at a pressure of 200 lb.

Eskwood.—The s.s. *Eskwood*, built by Messrs. W. Harkess & Son, Ltd., to the order of The Meteor Steamship Co., Ltd. (R. A. Constantine & Donking, managers), of Middlesbrough, has just been taken for her official trial trip. She was loaded with about 1,030 tons cargo and bunkers on a draft of 13 ft. 4 in. A mean speed of 10½

knots was obtained on several runs on the measured mile. The owners and Mr. Wm. Constantine who superintended the vessel during construction, were highly satisfied with the ship and engines, the speed being considerably in excess of contract. On the conclusion of the trial the vessel proceeded to Swansea. See Launches, September.

Imataka.—The s.s. *Imataka*, built by Sir Raylton Dixon and Co., Ltd., of Middlesbrough, and engined by Messrs. Blair & Co., Ltd., Stockton-on-Tees, to the order of Messrs. Bowser Bros., McConnell & Co., Ltd., has just undergone a most successful trial on the East Coast. During the trial trip of six hours' duration, the engines, of which the cylinders are 23 in., 37½ in., 61½ in., by 39 in. stroke, worked with the utmost smoothness; the new design of condenser proved very efficient and easily maintained a high vacuum. The engines ran to 80 revolutions and developed 1,850 I.H.P., for which the boilers supplied an ample head of steam. Fully loaded the ship attained a speed of 13 knots, being well above that contracted for. See Launches, September.

Peebles. On September 16th, the steel screw steamer *Peebles*, built by Messrs. The Northumberland Shipbuilding Co., Ltd., Howdon-on-Tyne, to the order of Messrs. R. J. Sutherland & Co., Ltd., Newcastle-on-Tyne, left the Tyne for her official trial trip. After the trial trip, which proved satisfactory in every way, the vessel returned to the Tyne to load for Bombay under the command of Captain Wallace. See Launches, September.

Japanese Prince. On September 16th, the steamer *Japanese Prince* built by Messrs. Wm. Doxford & Sons, Ltd., of Sunderland, to the order of The Prince Line, Ltd., (James Knott, Esq.), Newcastle, had her sea trial. See Launches, September.

Princess Alice.—The steamship *Princess Alice*, the latest addition to the fleet of the Canadian Pacific Railway Co., has just successfully completed a series of exhaustive trials at sea off the mouth of the river Tyne. A high speed was maintained and the machinery and boilers worked to the entire satisfaction of the owners. The vessel has been fitted with the McNab Marine Register and Indicator instruments.

Roselands.—On September 16th, the steel screw steamer *Roselands*, built by Messrs. W. Gray & Co., Ltd., to the order of the Wilson Shipping Co., Ltd., West Hartlepool, Messrs. J. H. Wilson & Co., managers, was taken on her trial trip. The performance of the ship and machinery was very satisfactory, an average speed of 11 knots being attained. After the steamer had completed her trial she returned to the harbour when a number of guests were entertained to luncheon. Later in the evening the *Roselands* left for Hull to load for the River Plate. For Launch, see October issue.

Vryhandel. On September 20th, the *Vryhandel* proceeded on her official trial trip in Hartlepool Bay. The vessel has been built by Irvine's Shipbuilding and Dry Docks Co., Ltd., for Scheepvaart Maatschappij Cyclone of Antwerp. Throughout the trial the engines and all auxiliaries worked very smoothly and a speed of about 11 knots was obtained. The vessel afterwards proceeded to the White Sea to load. A Cochran (Ancram) Donkey Boiler with Patent Seamless Furnace has been supplied and fitted. For Launch see October issue.

Borodino.—On September 19th, this vessel, built by Messrs. Earle's Shipbuilding and Engineering Co., Ltd., Hull, to the order of Messrs. Thos. Wilson, Sons & Co., Ltd., Hull, proceeded to sea for her official trial trip. The performance of ship and machinery gave great satisfaction to all concerned and a speed of 13½ knots was obtained. For Launch, see October issue.

Rothley. On September 20th, the screw steamer *Rothley*, built by the Blyth Shipbuilding and Dry Docks Co., Ltd., was taken to sea for trial. The vessel, which is the latest addition to the fleet of steamers owned by the Rothley S.S. Co., Ltd. (Messrs. Stephens, Sutton & Stephens, Newcastle-on-Tyne, managers), has been constructed under Lloyd's special survey for the society's highest class and measures [illegible] in length, with a beam of [illegible] ft. in. She is of the improved single deck type, having poop, bridge and forecastle accommodation. The accommodation for the captain is in a steel deck house, and the officers and engineers in suite houses on the bridge, the crew being housed in the forecastle. The *Rothley* is specially adapted for the general cargo trade and will trade having large hatches and great holds and is equipped with the latest and latest design of deck machinery, including eight cargo winches for the quick and economical handling of cargoes. The engines, of good power, have been supplied by Messrs. The North Eastern Marine Engineering Co., Ltd., Wallsend, having cylinders 25 in., 41 in. and 68 in. by 45 in. stroke, working at 180 lbs. pressure. The representatives of owners, builders and engineers on board during the trial were highly satisfied with the performance of both ship and machinery, good results being obtained. The hull and machinery have been built under the supervision of Mr. C. Lundquist, of Newcastle-on-Tyne.

Baron Erskine.—On September 22nd, Messrs. H. Hogarth and Sons' new steamer *Baron Erskine*, built by Messrs. Archd. McMillan & Son, Ltd., Dumbarton, ran trials on the Firth of Clyde, when a speed of 12 knots was attained. The dimensions of the vessel are: Length between perpendiculars [illegible] ft., breadth [illegible] ft. and depth [illegible] ft. The machinery has been supplied by Messrs. David Rowan and Co., Glasgow. On completion of the trials which were in every way satisfactory, the steamer left for Cardiff to load.

Essex Abbey. On September 20th the speed trial of the new [illegible] ton cargo steamer *Essex Abbey*, which has been built at Greenock to the order of Messrs. H. Meldrum and Co., London, were successfully carried out on the Firth of Clyde. Despite the unfavourable weather conditions, the vessel, in light trim, attained the high speed of 14 knots on the measured mile off Skelmorlie, with the coal consumption well within the limit. For Launch, see October issue.

Tysla. On October 2nd the shelter deck steamer *Tysla* built and engined by Messrs. Wm. Doxford & Sons, Ltd., Sunderland, to the order of Messrs. Fearnley & Eger, of Christiania, for Den Norske Afrika og Australialinje, ran a successful trial, when a mean speed of 13½ knots was obtained. The *Tysla* has been built to British Corporation and Norwegian Veritas Classifications and these societies were represented at the trial; also present were Mr. A. Nicol, Captain Edvardsen and Mr. A. Kitts. For Launch, see October issue.

Oristano. On October 6th the steel screw steamer *Oristano*, built by Messrs. The Northumberland Shipbuilding Co., Ltd., Howdon-on-Tyne, to the order of Messrs. Furness, Withy and Co., Ltd., West Hartlepool, left the Tyne for her official trial trip. The trial trip proved in every way satisfactory and a speed of 11 knots was obtained. For Launch see October issue.

Cayo Romano. On October 6th, the new steamer *Cayo Romano*, built by Messrs. William Dobson & Co., Walker, for the Cayo Line, Ltd., was taken for her trial run off the Tyne. After the trial the vessel left the Tyne for Bordeaux. For Launch, see October issue.

Coramba.—On October 9th, the new twin-screw steamer *Coramba*, built at Troon for the North Coast Steam Navigation Co., Sydney (N.S.W.), ran trials on the Clyde. The machinery worked satisfactorily, and a speed in excess of contract requirements was attained. The *Coramba* sailed for Sydney, *viâ* the Cape. She has been built under the superintendence of Messrs. Paton and Hendry, Glasgow. For Launch, see October issue.

Galway Castle. On October 4th the large twin screw steamer built by Messrs. Harland & Wolff, Ltd., Belfast, for the Union-Castle Line, left Belfast and, after very satisfactory trials on the Clyde, proceeded to Hamburg. During construction the vessel has been under the supervision of Mr. John List, R.N.R., superintendent engineer, and Mr. C. W. Shute, the Company's naval architect. For Launch, see May issue.

Wollongbar. The new twin screw passenger and cargo steamer *Wollongbar* built at Troon for the North Coast Steam Navigation Co., Sydney, N.S.W., has commenced her official trials in the Firth of Clyde. On October 7th she ran a six hours' trial with a large company of guests on board. The trials were satisfactory in every respect, the contract speed of 12 knots being exceeded by nearly half a knot. The vessel has been built to the British Corporation class for the owners, New South Wales Lloyds. Her dimensions are: Length [illegible] ft., breadth [illegible] ft., and depth [illegible] ft. She has accommodation for [illegible] first-class and forty second-class passengers. The propelling machinery consists of triple-expansion [illegible] engines, with four single-ended return tu[illegible] boilers.

Zealandic.—On October 12th this fine large twin-screw steamer built by Messrs. Harland & Wolff, Ltd., for the White Star-Dominion Australian service, left Belfast after satisfactory trials for Glasgow. For Launch, see August issue.

Cotovia.—On October 13th the s.s. *Cotovia* proceeded on her official trial trip in Hartlepool Bay. Throughout the trip the engines and all auxiliaries worked very satisfactorily, and the vessel on several runs averaged a speed of 12 knots which was extremely satisfactory to all on board, including the owners' representatives. The vessel and her machinery have been closely superintended during construction by Mr. W. J. Steele, of London, who has been residing in Hartlepool since the laying of the keel. For Launch, see October issue.

Redesmere.—On October 12th the s.s. *Redesmere*, built by the Sunderland Shipbuilding Co., Ltd., to the order of Messrs. Herbert Watson & Co., of Manchester, for the Watson Steamship Co., Ltd., was taken to sea on her official loaded trial. The trial was in every way most satisfactory, and everything worked well. Mr. Herbert Watson, who was present, expressed himself as highly pleased with the vessel and her machinery. On completion of the trial the ship proceeded direct to Palermo, to take her place in the owners' Mediterranean trade, for which she is specially designed. For Launch, see October issue.

Egremont Castle.—On October 14th, the s.s. *Egremont Castle*, built by Messrs. Craig, Taylor & Co., Ltd., Thornaby Shipbuilding Yard, Stockton-on-Tees, was taken to sea for her trial trip, which proved highly satisfactory. During the whole of the trip everything worked with the greatest smoothness, and a speed of 14½ knots was maintained. The vessel has been built to the order of the Lancashire Shipping Co., Ltd. (Messrs. James Chambers & Co.), Liverpool, under the superintendence of Messrs. E. H. Bushell, Fletcher & King, of Liverpool, Captain Hendy, of Liverpool, and Mr. A. H. Sutcliffe (resident inspector), and they all expressed themselves thoroughly pleased with the ship and engines. Immediately after the trial the vessel left for Tampa under command of Captain B. V. Smith. She has been fitted with a complete set of McNab Direction and Revolution Indicators. For Launch, see October issue.

Koopa.—The new twin-screw passenger steamer *Koopa*, built and engined by Messrs. Ramage & Ferguson, Ltd., for the Brisbane Tug and Steamship Co., Ltd., Brisbane, Queensland, has completed a most satisfactory trial trip on the Firth of Forth, a speed of over 16 knots being obtained on the measured mile. A feature of the trial was the absence of vibration, the vessel proving herself most comfortable at all speeds. The requirements of the contract as to speed and trim draught and stability which were of the most difficult nature, were fully conformed to, and Mr. H. E. Campbell, representing the owners, expressed himself as being highly pleased with the results obtained. The vessel sailed for Brisbane under the command of Captain R. D. Taylor. For Launch, see October issue.

South Shields.—The new vehicular ferry *South Shields*, which has been built for the service between North and South Shields by Messrs. Wood, Skinner & Co., Ltd., Bill Quay, to the order of the Tyne Improvement Commission, has run her official trials. The vessel is of the following dimensions:—Length overall, 115 ft.; beam over sponsons, 43 ft.; beam overall, 30 ft.; depth moulded, 11¼ ft. She is a departure from the present type of vehicular ferryboats, being twin-screw instead of paddle. She is also fitted with double gangways to facilitate the traffic, and the alteration in design of vessel will permit many more vehicles to be accommodated. On the trials the vessel was loaded as she will be when carrying the heaviest weights, and maintained an average of 9·9 knots. The stopping, turning and manœuvring trials were also all very satisfactory. The twin-screw triple-expansion engines worked without the slightest hitch and with an entire absence of vibration. Besides the main engines, the vessel is fitted with double friction gear hoisting engines for the gangways. Amongst those present were Mr. N. G. Gedye (engineer to the Tyne Improvement Commission), Mr. C. H. Tate (naval architect), Mr. McClintock (manager of Howdon Yard), Captain Frith (harbourmaster), Mr. Dixon (ferry superintendent), Mr. L. Skinner (Wood, Skinner & Co.), Mr. George and Mr. Thos. Baird (Baird Bros.).

Otto Trechmann.—On October 14th, the handsome steel screw steamer *Otto Trechmann*, built by Messrs. William Gray & Co., Ltd., for Messrs. Trechmann Bros., West Hartlepool, had her trial trip. A run was made to the Tyne and back, with eminently satisfactory results both in regard to the performance of ship and machinery, the average speed of ship being 12 knots. After disembarking her visitors the vessel proceeded on her voyage to Cardiff to load. The *Otto Trechmann* is the eighth steamer Messrs. William Gray & Co., Ltd., have built for Messrs. Trechmann Bros. She will take the highest class in Lloyd's Register, and is of the following dimensions, viz.:—Length overall, 382 ft.; breadth, 51 ft. 6 in., and depth, 24 ft. 10 in., with extra long bridge poop and topgallant forecastle. The saloon, state-rooms, captain's, officers' and engineers' rooms, etc., will be fitted up in houses on the bridge deck and the crew's berths in the forecastle. The hull is built with deep bulb-angle frames, cellular double bottom and large aft-peak ballast tank, eight steam winches, steam-steering gear amidships, hand-screw gear aft, patent direct steam windlass, steel middle line bulkhead for grain cargoes, stockless anchors, telescopic masts with fore and aft rig, boats on deck overhead, and all requirements for a first-class cargo steamer. Triple-expansion engines are being supplied by the Central Marine Engine Works of the builders, having cylinders 25½ in., 40½ in. and 67 in., with a piston stroke of 45 in., and three large steel boilers for a working pressure of 180 lbs. per square inch. Messrs. Wailes, Dove & Co.'s "Bitumastic" enamel has been applied to bunkers, boiler-room, and their "Bitumastic" covering to the tank tops.

Westmoor.—On October 16th, this steel screw steamer, built to the order of Messrs. Walter Runciman & Co., Newcastle, by Messrs. John Readhead & Sons, Ltd., West Docks, South Shields, was taken to sea on her official trial trip, which proved satisfactory in every way. The vessel is of the improved single-deck type, and is built to Lloyd's highest class, and under their special survey. She is 375 ft. in length by 51 ft. by 28 ft. 9 in., with poop, long extended bridge, and top gallant forecastle, and is fitted throughout with shifting boards and grain feeders in compliance with the requirements of the Grain Loading Act, and well equipped with a large number of steam winches and derricks for the rapid handling of cargoes. Steel houses are constructed on the bridge deck for accommodation of captain and officers, and also for engineers and apprentices. She has a double bottom for water ballast as well as a large after-peak tank. The vessel will be fitted with triple-expansion engines, also constructed by Messrs. John Readhead & Sons, Ltd., having cylinders 26 in., 42 in. and 69 in., by 48 in. stroke, steam being obtained from two large steel boilers of 180 lbs. pressure. There is also a large marine type donkey boiler.

BOARD OF TRADE EXAMINATIONS.

1911 — Extra First Class.

July 27th	Harvey, C.	.. ..	Ex 1C N. Shields
,, 27th	Makwell, J	.. ..	Ex 1C Hull
,, 27th	Metcalf, H.	.. ..	Ex 1C N.Shields
,, 27th	Peel, F.	.. ..	Ex 1C N.Shields
,, 27th	Richardson, R	.. ..	Ex 1C N.Shields
,, 27th	Watson, W	.. ..	Ex 1C London

NOTE—1C denotes First Class: 2C Second Class.

July 27th.

Annan, J.	2C N.Shields
Back, F.	1C N Shields
Batley, F.	1C N Shields
Bevin, G.	2C Liverpool
Birch, A.	2C N.Shields
Bristow, H.	1C Hull
Carter, H.	1C Sunderl'd
Cawthorn, A.	2C Hull
Cromar, T.	1C Greenock
Davies, J	1C N.Shields
Dempster, D.	2C Greenock
De Werpe, A.	1C Sunderl'd
Dodds, W.	1C Greenock
Downing, A	2C Aberdeen
Dowsen, M	2C N.Shields
Finkle, N.	1C Sunderl'd
Gale, F.	2C N.Shields
Gordon, J.	2C Londn'ry
Guthrie, A.	1C Aberdeen
Hardy, C.	2C Liverpool
Harris, C.	1C N.Shields
Hogg, M.	1C N.Shields
Hughes, F	1C Liverpool
Hutton, H.	1C Londn'ry
Jarman, J.	1C Aberdeen
Lidgey, F.	2C Bristol
Lindegreen, T.	2C Greenock
Low, C.	1C Aberdeen
Miller, J.	1C London
Nicoll, J.	2C Aberdeen
O Halloran, H	1C Greenock
Parker, T.	1C Sunderl'd
Potts, A.	1C N.Shields
Quine, L.	2C Liverpool
Rainford, A.	2C London
Ramsay, A	1C Greenock
Richardson, A.	2C Liverpool
Richardson, T.	2C Hull
Robson, A.	2C N.Shields

Sim, J. ..... 2C Aberdeen
Stott, F. ..... 1C Sunderl'd
Story, E. ..... 2C London
Summerill, T. ..... 2C Bristol
Walker, A. ..... 2C London
Wesley, P. ..... 2C Sunderl'd
Williams, R. ..... 2C N.Shields
Williams, R. ..... 2C N.Shields
Wilson, H. ..... 1C N.Shields
Wood, F. ..... 2C N.Shields

August 8th.

Adams, H. ..... 2C Belfast
Bilsland, R. ..... 1C London
Clare, W. ..... 2C Liverpool
Cook, J. ..... 2C Liverpool
Crighton, A. ..... 1C South ton
Davies, R. ..... 2C N.Shields
Evens, H. ..... 2C Liverpool
Flavell, J. ..... 2C Liverpool
Gibb, W. ..... 1C Liverpool
Greig, G. ..... 1C Leith
Isaac, F. ..... 1C Cardiff
Jordan, T. ..... 1C Leith
King, R. ..... 1C Southampton
Lewis, A. ..... 2C Cardiff
McGilvray, A. ..... 2C Glasgow
Malcolm, G. ..... 2C Belfast
Merson, J. ..... 2C N Shields
Oates, R. ..... 2C N.Shields
Paterson, A. ..... 2C South'ton
Richardson, W. 2C Cardiff
Round, J. ..... 2C Liverpool
Sim, J. ..... 2C South'ton
Skerratt, W. ..... 2C Cardiff
Taylor, D. ..... 2C Leith
Taylor, F. ..... 1C N.Shields
Telford, R. ..... 2C N.Shields
Tookey, A. ..... 1C London
Walker, J. ..... 1C Leith

August 10th.

Beattie, J. ..... 2C Liverpool
Caldwell, D. ..... 2C Greenock
Carter, H. ..... 1C Liverpool
Craige, R. ..... 2C Liverpool
Cunningham, D. 2C Greenock
D'Agorne, A. ..... 2C London
Dewie, J. ..... 2C Dundee
Dinner, W. ..... 1C N.Shields
Finn, J. ..... 2C N.Shields
Galloway, J. ..... 2C Liverpool
Guthrie, C. ..... 2C Greenock
Harbottle, A. ..... 2C N.Shields
Hedley, W. ..... 2C N.Shields
Henry, J. ..... 2C Dundee
Jackson, J. ..... 1C N.Shields
Jellard, J. ..... 2C Liverpool
Kyle, G. ..... 2C N.Shields
Legg, J. ..... 1C Dublin
Lewis, H. ..... 1C Liverpool
Lindsay, R. ..... 2C Liverpool
Lorain, J. ..... 1C N.Shields
McCaughan, W. 1C Liverpool
McIntosh, W. ..... 2C Greenock
Marshall, J. ..... 2C Greenock
Miskin, G. ..... 2C London
Monteith, R. ..... 1C Greenock
Morris, D. ..... 1C London
Murat, J. ..... 1C Liverpool
Paterson, S. ..... 2C Greenock
Shearer, S. ..... 1C Liverpool
Sheraton, R. ..... 1C N Shields
Smail, R. ..... 2C Greenock
Southgate, A. ..... 1C Liverpool
Squire, O. ..... 1C London
Tiddeman, E. ..... 2C London
Tullock, L. ..... 1C N.Shields
Wilson, R. ..... 1C London

August 17th.

Allan, W. ..... 1C W. Hart'l
Anderson, R. ..... 2C Leith
Bell, W. ..... 2C N.Shields
Bowen, A. ..... 1C Leith
Brown, J. ..... 1C Glasgow
Brown, F. ..... 1C Cardiff
Campbell, D. ..... 2C Glasgow
Cardy, E. ..... 2C Cardiff
Carter, W. ..... 1C Liverpool
Chapman, W. ..... 1C Glasgow
Dale, G. ..... 1C London
Dodgeson, G. ..... 1C Liverpool
Daniels, F. ..... 2C London
Davies, D. ..... 2C Cardiff
Dewar, J. ..... 1C Glasgow
Dewar, J. ..... 2C Leith
Dewar, H. ..... 1C London
Elder, J. ..... 1C Glasgow
Evans, A. ..... 1C London
Gendall, W. ..... 2C Plymouth
Gray, J. ..... 2C W. Hart'l
Groves, A. ..... 2C Cardiff
Hadley, J. ..... 1C Cardiff
Harvey, J. ..... 2C Liverpool
Hendry, A. ..... 2C Leith
Hudspeth, E. ..... 2C London
Hutton, H. ..... 1C Liverpool
Jamieson, W. ..... 1C Glasgow
Jessop, G. ..... 1C N.Shields
Jones, W. ..... 2C N.Shields
Jordan, E. ..... 2C Cardiff
Kelly, J. ..... 1C Glasgow
Kendall, J. ..... 2C Plymouth
Knowles, B. ..... 1C Cardiff
Linton, G. ..... 2C Cardiff
Liscombe, H. ..... 2C Cardiff
Logan, J. ..... 1C Glasgow
Mackenzie, D. ..... 1C Glasgow
McKinney, T. ..... 1C Liverpool
McLeod, J. ..... 1C Glasgow
Matthews, J. ..... 2C Liverpool
Mitchelson, Y. ..... 1C N.Shields
Murchie, J. ..... 2C Glasgow
Murray, J. ..... 2C Glasgow
Paterson, A. ..... 1C Glasgow
Philp, J. ..... 2C South'ton
Sowerby, C. ..... 1C N.Shields
Stark, G. ..... 2C W. Hart'l
Stenhouse, J. ..... 1C N Shields
Steven, J. ..... 1C Glasgow
Storm, J. ..... 1C Cardiff
Thomson, D. ..... 1C London
Thomson, G. ..... 2C Liverpool
Walters, T. ..... 1C Cardiff
Whicher, L. ..... 2C Cardiff
Whincop, W. ..... 2C N.Shields
Williams, W. ..... 2C Cardiff
Wilson, J. ..... 2C N.Shields
Young, A. ..... 1C N Shields

August 24th.

Archer, H. ..... 1C Hull
Allison, R. ..... 1C Greenock
Arthur, J. ..... 1C Sunderl'd
Barnes, T. ..... 2C Liverpool
Birch, T. ..... 2C Sunderl'd
Blake, J. ..... 1C N.Shields
Bruce, E. ..... 1C Liverpool
Cairnes, G. ..... 2C Sunderl'd
Christie, G. ..... 1C N.Shields
Cockle, C. ..... 2C Bristol
Collinson, D. ..... 2C London
Cowell, J. ..... 1C N.Shields
Cumming, A. ..... 2C N Shields
Douglas, G. ..... 1C Greenock
Dyer, P. ..... 2C London
Ellecombe, W. 1C Sunderl'd
Ferguson, A. ..... 2C Greenock
Fletcher, G. ..... 2C N.Shields
Hall, H. ..... 2C London
Herbert, J. ..... 2C N Shields
Hope, J. ..... 2C N.Shields
Kerr, J. ..... 2C Liverpool
Kerrington, E. ..... 2C London
Kerr, A. ..... 2C Greenock
Lawrence, S. ..... 2C London
McDonald, J. ..... 2C Greenock
Morris, H. ..... 2C London
Milne, A. ..... 2C Greenock
Mitchell, R. ..... 2C N.Shields
Neill, J. ..... 2C N.Shields
Penkeyman, S. ..... 2C Liverpool
Platt, J. ..... 2C London
Quested, W. ..... 2C London
Rhynas, J. ..... 2C N.Shields
Scott, J. ..... 2C Greenock
Scott, M. ..... 2C Londn'ry
Skinner, W. ..... 2C N Shields
Smyth, J. ..... 2C Londn'ry
Vincent, J. ..... 2C London
Watson, W. ..... 2C London
Wilson, A. ..... 2C Greenock
Wilson, B. ..... 2C Liverpool
Yorston, R. ..... 2C Greenock

August 31st.

Anderson, J. ..... 2C Glasgow
Buscombe, W. ..... 1C Cardiff
Carson, W. ..... 2C Liverpool
Chapman, T. ..... 2C N.Shields
Coppock, N. ..... 1C Cardiff
Crawford, J. S. 2C Belfast
Duncan, J. ..... 2C Cardiff
Douglas, J. ..... 2C South'ton
Forrest, W. ..... 1C London
Goodman, G. ..... 1C Edinburgh
Grainger, B. ..... 1C Leith
Harrington, L. 1C Cardiff
Jenkins, H. ..... 1C N.Shields
Jones, E. ..... 2C Cardiff
Jordan, W. ..... 2C Glasgow
Kemp, H. ..... 1C Cardiff
Lewis, W. ..... 1C Cardiff
Long, J. ..... 2C Glasgow
Lord, R. ..... 1C London
McIntyre, J. ..... 2C Liverpool
Paul, F. ..... 2C Liverpool
Phillips, F. ..... 2C Cardiff
Phillips, V. ..... 2C London
Roseburgh, V. 2C N.Shields
Ross, J. ..... 2C Leith
Rowe, H. ..... 1C London
Sherman, S. ..... 1C London
Stokes, A. ..... 1C London
Weddell, W. ..... 2C N.Shields
Wharton, G. ..... 2C London

September 7th

Anderson, A. ..... 2C Glasgow
Armstrong, R. ..... 1C N.Shields
Bain, A. ..... 1C Glasgow
Barber, J. ..... 1C N.Shields
Beaumont, W. ..... 1C N.Shields
Brown, F. ..... 2C Hull
Cooper, G. ..... 2C London
Darroch, C. ..... 2C Glasgow
Dickinson, A. ..... 1C N.Shields
Foster, S. ..... 2C Liverpool
Forrest, A. ..... 2C Glasgow
Garrow, J. ..... 2C Glasgow
Greenhorn, F. 1C N.Shields
Hamnett, J. ..... 1C Liverpool
Harrop, G. ..... 1C Liverpool
Hughes, W. ..... 2C Liverpool
Hume, J. ..... 1C Glasgow
Hunter, J. ..... 1C Liverpool
Kennaugh, J. ..... 2C Liverpool
Kerr, J. ..... 1C N.Shields
Laird, M. ..... 1C Glasgow
Lee, T. ..... 1C Liverpool
McKenzie, J. ..... 1C Glasgow
Martin, J. ..... 1C Glasgow
Martin, D. ..... 2C Glasgow
Nelson, J. ..... 1C Glasgow
Orange, H. ..... 1C N.Shields
Page, J. ..... 1C N.Shields
Parker, T. ..... 1C Glasgow
Perry, A. ..... 1C Glasgow
Pearson, J. ..... 1C Glasgow
Pearson, J. ..... 1C Glasgow
Pearson, J. ..... 1C Glasgow
Parker, W. ..... 2C London
Williams, W. ..... 1C Glasgow
Wilson, J. ..... 1C Glasgow

September 14th

Alexander, J. ..... 2C Greenock
Bryce, J. ..... 1C N Shields
Brown, E. ..... 1C N.Shields
Cooper, W. ..... 1C Dundee
Fisher, A. ..... 1C London
Gardner, J. ..... 2C Liverpool
Grant, H. ..... 1C Greenock
Hogg, W. ..... 1C Greenock
Kendall, H. ..... 2C Dublin
Kilpatrick, J. ..... 2C N.Shields
Leviss, J. ..... 1C N.Shields
McClelland, J. 2C N Shields
Mitchell, W. ..... 2C Dundee
Pate, D. ..... 1C Greenock
Pearson, W. ..... 1C Liverpool
Peters, W. ..... 2C Glasgow
Russell, G. ..... 2C Greenock
Scott, T. ..... 2C N Shields
Sims, G. ..... 1C N.Shields
Smith, W. ..... 2C N Shields
Walker, J. ..... 2C N Shields

September 21st

Atkinson, R. ..... 1C N.Shields
Bamborough, W. 2C Leith
Bell, C. ..... 2C N Shields
Brooker, J. ..... 2C W. Hart'l
Cartwright, J. ..... 2C Liverpool
Chalmers, T. ..... 2C Glasgow
Crooks, R. ..... 2C South'ton
Dawson, D. ..... 1C Glasgow
Dodds, R. ..... 2C South'ton
Donaldson, J. ..... 2C Leith
Edmunds, D. ..... 2C Cardiff
Fairweather, J. 2C Cardiff
Fawcett, T. ..... 2C W. Hart'l
Fowler, W. ..... 2C Glasgow
Fry, T. ..... 2C Liverpool
Gillan, W. ..... 1C N Shields
Goodman, R. ..... 1C London
Grivas, K. ..... 1C Cardiff
Hartas, J. ..... 2C W. Hart'l
Hay, D. ..... 2C Leith
Henderson, F. 1C Glasgow
Hewson, J. ..... 2C Glasgow
Hughes, E. ..... 2C Cardiff
Johnson, M. ..... 2C Cardiff
Lambert, A. ..... 2C Liverpool
Lowe, R. ..... 2C W Hart'l
McCormick, J. ..... 2C Leith
McKenzie, G. ..... 2C W. Hart'l
McLachlan, F. 1C Cardiff
Moore, J. ..... 2C Glasgow
Melville, J. ..... 1C London
Miller, A. ..... 2C W. Hart'l
Munro, W. ..... 2C Leith
Newton, J. ..... 1C N.Shields
O'Connell, M. 1C London
Pattison, J. ..... 2C London
Rosearth, R. ..... 2C Glasgow
Rankin, E. ..... 1C Cardiff
Robertson, H. ..... 1C N.Shields
Richards, D. ..... 1C London
Robbins, C. A. ..... 1C London
Scarffetter, H. 2C Liverpool
Smith, W. ..... 2C W Hart'l
Snowdon, G. ..... 1C N Shields
Tod, W. ..... 2C Leith
Turnbull, J. ..... 2C W Hart'l
Watkins, J. ..... 1C London
Whitehouse, R. 1C London
Young, H. ..... 1C London

September 28th.

Baker, H.	2C	Sunderl'd
Brand, C.	2C	Aberdeen
Cameron, K.	2C	Greenock
Cockburn, G.	1C	N Shields
Cotton, C.	1C	Bristol
Davies, J.	2C	Liverpool
Dimech, D.	2C	London
Duncan, D. C.	2C	London
Everingham, F.	1C	Hull
Goodwin, J.	2C	Liverpool
Harvey, W.	1C	Sunderl'd
Johnstone, A.	2C	Greenock
Jones, E.	2C	Liverpool
MacDonald, R.	1C	Liverpool
McKenzie, A.	2C	London
Matthews, C.	2C	Liverpool
Mitchell, A.	1C	N Shields
Muir, C.	2C	London
Paterson, A.	1C	Greenock
Richardson, W.	1C	London
Robertson, J.	2C	Aberdeen
Robertson, W.	2C	Aberdeen
Spencer, J.	2C	Greenock
Smith, G.	2C	Dover
Tegart, W.	1C	L'nderry
Thomson, R.	2C	N Shields
Wallace, A.	2C	Greenock

October 5th.

Akers, O.	1C	Cardiff
Alexander, J.	1C	Glasgow
Berry, C.	1C	Liverpool
Campbell, L.	2C	Belfast
Carson, H. D.	2C	Glasgow
Conpar, D.	1C	Glasgow
Coombes, W.	2C	Cardiff
Cotts, E.	2C	Glasgow
Cresswell, F.	2C	Cardiff
Dawson, C.	2C	Leith
Dickie, J.	1C	Glasgow
Duncan, J.	1C	Liverpool
Gray, W.	1C	London
Grey, G.	1C	N.Shields
Gillard, S.	1C	Cardiff
Godfrey, T.	2C	N.Shields
Hannay, J.	2C	London
Helps, C.	1C	South'ton
Hemphill, H.	1C	Belfast
Hogg, J.	1C	Cardiff
Inniss, A.	2C	Liverpool
Kemp, W.	1C	Liverpool
Lamb, W.	2C	Glasgow
Lindsay, G.	1C	London
Lock, T.	2C	Cardiff
McFarline, H.	1C	Liverpool
McLeod, J.	1C	Glasgow
Malloy, F.	2C	N Shields
Mitchell, R.	2C	South'ton
Moore, H.	2C	Liverpool
Muir, W.	1C	N Shields
Pearson, W.	2C	Glasgow
Peden, T.	2C	Glasgow
Pollock, W.	1C	Glasgow
Quigley, A.	2C	Glasgow
Rainey, R.	1C	London
Ramsay, N.	2C	N.Shields
Rodgers, J.	2C	Liverpool
Rogers, T.	1C	Falmouth
Rose, J.	1C	Liverpool
Scrimgeour, W.	1C	Liverpool
Sonter, R.	2C	Leith
Stirling, J.	1C	Glasgow
Thomas, E.	1C	Cardiff
Townsend, J.	1C	N.Shields
Treweeks, H.	2C	N Shields
Twelvetrees, G.	2C	Liverpool
Watson, J.	2C	Glasgow
Whicher, S.	1C	Cardiff
Williams, A.	2C	Cardiff
Wilson, D.	2C	Leith
Wright, M.	1C	N.Shields

October 12th

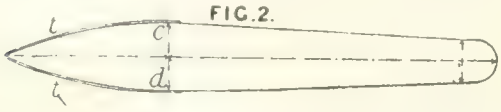
Banks, J.	1C	Greenock
Byrne, R.	2C	London
Caird, G.	1C	Greenock
Chambers, G.	2C	N.Shields
Coslett, J.	1C	Liverpool
Cuthbert, G.	2C	Greenock
Devine, J.	2C	Dublin
Dew, J.	1C	Greenock
Dryden, E.	1C	N.Shields
Economides, D.	1C	N.Shields
Ellis, J. H.	2C	Liverpool
Gillett, W. J.	2C	London
Glass, D.	1C	Liverpool
Gregg, B.	1C	London
Hardie, D.	1C	Liverpool
Harwood, C.	2C	London
Hill, W. E.	1C	Greenock
Hobby, F.	2C	N.Shields
Jeffrey, D.	2C	Greenock
Lloyd, F.	2C	Greenock
Matheson, R.	2C	Greenock
McArthur, C.	1C	Greenock
McFarlane, L.	2C	Greenock
McMurchy, J.	1C	Greenock
Monro, H.	1C	Greenock
Murdoch, A.	1C	Greenock
Roberts, G.B.S.	1C	Greenock
Stephenson, F.	2C	London
Unsworth, F.	2C	Liverpool
Wilkinson, R.	1C	London
Yanekian, K.	2C	South'ton

The Marine Engineer and Naval Architect Patent Record.

Compiled by Messrs. E. P. Alexander & Son, Chartered Patent Agents, 306, High Holborn, London, W.C.

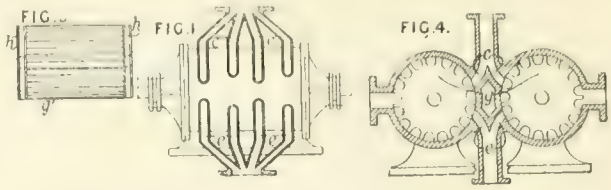
13,494. Protecting Ships; Air-casings. Comprises a flat-bottomed hull having the greatest draught forward and the maximum beam towards the bows. The greatest width *c*, *d* is about one-eighth of the length, and situated at a distance of one-third of the length from the bows. The difference in draught fore and aft is about one-quarter of the draught

FIG.2.



aft. To prevent damage by grounding, a steel cuirass *t* is fitted to the bows, and a thick sheet of indiarubber, having upon its surface spherical bags or balloons, is situated between it and the ship. Metal tubes for compressed air are also situated at the bottom of the hull to avoid sinking.

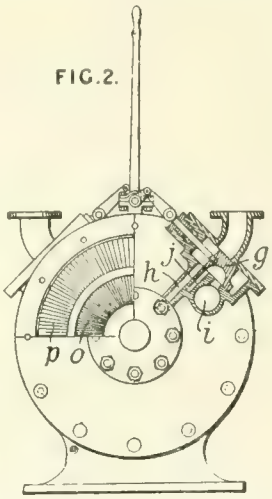
14,118. Turbines. Jet-wheels of the kind described in specification 13,987/10 are provided with an improved arrangement of inlet ports. A three-way cock admits the motive fluid for forward or reverse driving to passages *r* or *e*, which are disposed at different points and alternate levels



along the length of the cylinders enclosing the rotors *g*. These rotors are provided with pockets of the shape shown in Fig. 4, extending between circular packed flanges *h*, Fig. 3. The motor is applicable for driving ships with two propellers.

14,865. Turbines. Axial-flow Type; Reversing. A reversible turbine is made with two concentric sets of blades *o*, *p* for high and low pressure working respectively. Two inter-connected valves *g*, one at each end of the turbine, are provided for reversing. Each valve controls two inlet ports *h*, *j* leading to the blade sets *o*, *p* respectively, and an exhaust

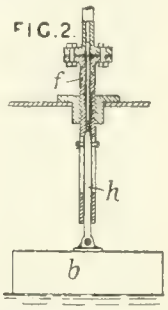
FIG.2.



port *i*. When one valve connects the ports *h* and *j* the other connects the ports *j* and *i*. In the position shown, steam passes through the port *h* to the high-pressure blades *o*, whence it passes through the corresponding port *h* at the other end of the turbine. It is then passed to the low-pressure blades *p*, and finally passes through the port *j* to the exhaust port *i*.

15,124. Steam Generators. Feed-water, controlling; alarms, low-water. Float apparatus for controlling the supply of feed-water, or for operating a low-water alarm, comprises

FIG.2.



an adjustable tube *f* in the top of the generator or vessel and in communication therewith, a rod *h* formed at its top with a valve adapted to seat in the tube *f*, and a float *b* attached to the lower end of the rod.

The Marine Engineer

And Naval Architect.

LONDON, DECEMBER, 1911.

THE THAMES IRONWORKS AND THE COMMERCIAL SUCCESS OF INDUSTRIAL ENTERPRISE

THE announcement of the fact of the appointment by the Chancery Division of the High Court, of a receiver and manager of the Thames Ironworks Shipbuilding and Engineering Company, did not cause any surprise to those who, like ourselves, have been acquainted with the economic conditions which have obtained in reference to engineering and shipbuilding on the banks of the Thames for the past thirty-five years. The aspect of the case is a very significant one, not only from the standpoint of industrial London, but from the national standpoint, of the existence on the Thames of adequate repairing facilities for naval vessels in the case of war. Reviewing the past, what do we find, but that the old-established firms of Maudsleys, Humphreys and Penns have ceased to exist, and the engineering and boiler works of the latter have been absorbed by the Thames Ironworks, which remains the sole instance of representation of a manufacture which in the past has been one for which the port of London held a world-wide reputation. Two other existing firms have migrated to other parts of the kingdom, *viz.*: Messrs. Yarrow have gone to the Clyde and Messrs. Thorneycroft to Woolston. Those who have made a study of the economic conditions obtaining in London for many years past have long recognised that the cost of the raw material delivered in the Thames, the high cost of living, the consequential higher wages and the increasing burden of local taxation, must in time produce such a set of conditions that the remunerative utilisation of capital must necessarily cease to be a possible accomplishment, and render London a place which was not in a position to successfully compete with other districts where the conditions were much more favourable. It came as a surprise to many that the Admiralty saw their way to place the order for the *Thunderer* with the Thames Ironworks, as no authority has a better opportunity of judging of the prospect of commercial success of carrying out such an order than the Admiralty itself. To take one point, for example, in going round both the naval and private yards one cannot but be remarkably struck by the extensive means that have been adopted to reduce the cost of manufacture, by the installation of labour-saving appliances, and by the reduction of the amount of unnecessary transport of material. This is a process of reorganisation that has been in continual operation and during periods of great commercial activity when the burden of sinking fresh capital is comparatively a light one. These conditions however cannot obtain with regard to a concern which has been struggling for years against adverse trade conditions, and has only received spasmodic support in the form of orders for that class of work which specially demands improved methods of manufacture, the cost of which can only be covered by a succession of such orders carried out under sound economic conditions. The loading up of financial burden on the shoulders of the employer by the imposition of high municipal taxation, by greater liability under the Workmen's Compensation Act, and by the proposed further burdens under the National Insurance Bill, appear to us to tend in the very opposite direction to that in which trade unionists desire development to take place. This position has been forcibly pointed out in a letter written by Dr. John Inglis, of Glasgow, and appearing in *The Times* of November 13th, the contents of which form subject for serious thought by all those who have at heart the welfare of the industrial community of this country. Dr. Inglis states from an experience of more than half a century that the fierce competition in the industry of shipbuilding and marine engineering makes it difficult for any but the more fortunately placed establishments to keep their position within the solvent group, as the capital employed is large, the risks great and the technical skill not inconsiderable. He assumes that the capital invested is £180 per man employed, and the profits realized on the average do not exceed £5 per man, or about 2¾ per cent. on capital, after proper allowance for depreciation is made. The workman's share in wages is from £70 to £100 per annum, and the employer, who finds premises, workshops, machinery, materials, designs, buyers of the finished product, takes all risks and finances the workman weekly, while often waiting years for his own remuneration, need not be grudged the £5 per man per annum against the above workman's annual wages. But of this profit of £5 per man he has to survey the world for orders and collect money for paying his own and sub-contractor's workmen, and has to meet other calls as under. Workmen's compensation absorbs about 24s. per man per annum, and equals 3/10½ in the £ of income tax, or 13/4 per cent. on capital. The Insurance Bill, it is calculated, will probably mean an additional 23s. per man per annum, equal to 4/7 in the £ of income tax, or 12/9 per cent. on capital, and death duties recurring every twenty-five years will require at least 7/2½ per man to be set aside each year to meet them, equalling 1/5 per £ of income tax. These super taxes amount to 1½ per cent. on capital, or £2 4s. 2½d. per man employed, or 9/10½ per £ income tax, besides the usual 1/2, which is a heavy tax in the time of peace. Dr. Inglis concludes his letter by citing a piece of advice of Mr. Ruskin to working men, which we think it desirable to reproduce. "You need not think that, even if you obtained a majority of representatives in the existing Parliament, you could immediately compel any system of business broadly contrary to that now established

by custom. If you could pass laws to-morrow wholly favourable to yourselves as you might think, because unfavourable to your masters and to the upper classes of society, the only result would be that the riches of the country would at once leave it, and you would perish in riot and famine." It would be well for our national welfare if this advice were taken to heart by the working men of this country, whose dependence on the domestic utilisation of capital in a remunerative manner is of a much greater importance than they appear to appreciate, judging by their actions and words of the past few years.

OIL FUEL

WE have in the past given particulars from time to time as to the use of oil fuel in steamers, and as we know that the subject is particularly interesting to some of our readers we shall continue to do so from time to time. A series of comparative experiments as to the relative values of oil fuel and coal fuel have recently been made on steamers of the Canadian Pacific Railway, and the results have been reported by Captain Troup, who occupies the position of manager of the British Columbia coast service of the railway in question. The first vessel dealt with was the *Princess May*, which at the time was undergoing repairs, and as under the old conditions of burning coal the desired speed was not always attained, a change was considered absolutely necessary. The working of vessels through certain channels at certain states of the tide necessitated a rigid time table, but it was found that the time losses due to cleaning of the fires and handling the ashes involved frequently the losing of the tide and the necessity for anchoring, causing a further loss of time. Since the installation of oil burners it is found that this vessel can maintain her average with only two boilers in place of the three necessitated by coal. A marked improvement in the steaming qualities of the boilers is shown, owing to the steady pressure of steam which is maintained not only from watch to watch, but also from day to day. In order to further test the question the steamer *Princess Charlotte* was fitted with oil burning apparatus. Her boilers are six in number, and each boiler has three furnaces, each fitted with Cyclone burners. Equally good results have been achieved as with the other vessel, and it is found that three and three-quarter barrels of oil will perform the same duty as one ton of Vancouver Island coal. In order to maintain a substantial supply of oil to meet all reasonable contingencies the railway company have constructed a large tank having a capacity of about 55,000 barrels, in conjunction with a smaller tank of about 1,000 barrels capacity placed near the wharf. The transfer of oil from the large to the small tank is effected by a pipe line and steam pump, while the oil from the small tank is pumped by an electrically driven pump directly into the oil tanks of the steamer at the rate of about 1,000 gallons per hour.

SHIPBUILDING AND MARINE ENGINEERING FOR 1911.

OUR coming January number will be an enlarged and special issue. It will contain, in addition to many original articles by well known writers, an exhaustive return of the vessels and marine engines built throughout the world. It is the most exhaustive list published, and forms a complete record of the utmost use for reference. It should be in the hands of all those connected with the shipbuilding and marine engineering industries. The number has a rapid sale and orders should be placed now.

THE "LIGHTKEEPER."

THE Society which publishes this journal twice a year has in view the very worthy object of sending literature to those whose days are spent in solitary places of the earth—the lighthouses of the coast lands and islands. Our sympathy has been invoked in the direction of assisting to make known the Society, and we do so with pleasure, realizing that we owe much to the vigilance of the lightkeepers, and that their duties are carried on amid monotonous surroundings. The portrait of the keeper of the Menai Lighthouse, Mr. Young, appears in the winter issue of the "*Lightkeeper*," along with several others located in different parts of the world, among them Mrs. Dan. Williams, who has been keeper of the Little Traverse Lighthouse, Michigan, for fifteen years, her total service being thirty-eight years. It is with regret we note that if the gloomy forebodings which herald the issue of the winter number now before us are fulfilled—and we hope they will not be—the "*Lightkeeper*" will cease to exist as a publication of the Society from which it emanates, by reason of the cost, as the balance-sheet shows a deficit on this part of the work. An appeal is made for voluntary contributions to the funds of this mission and for subscribers to the magazine if it is to be kept afloat. On this point it may be said that the usefulness of such a magazine is beyond doubt, affording a link between the beneficent mission and those it seeks to keep in touch with. The pages contain matter of interest, and the illustrations are good. At the same time it is well that the funds should not be so far encroached upon for the sake of the publication, and it is suggested that a less expensive medium with a wider circulation on commercial lines would serve the purpose. The "*Lightkeeper*" combines information on the subject of lighthouses, lifeboats and cognate matters with the inculcation of higher motives in life and action. The Hon. Director of the mission is Mr. Samuel A. Strain, 21, Linenhall Street, Belfast.

THE DERMATINE CO.—The extension of the factory of this Company since the occasion of a former visit paid to it with a view to examine their products and methods of manufacture, has been completed, and the pressure which was laid upon the valve-making department especially has been relieved, so that the firm can now cope with orders from new customers, which formerly could not be dealt with, in connection with the Anchor bush valve, formerly described in our pages.

BACK TO THE LAND.—The increasing burdens which are being placed upon the industries of the country will tend ultimately, to bring home to the nation the mistakes made by the present-day style of rushing through of legislation, without due consideration of the probable effects on various departments of life. The letter in the "Glasgow Herald" bearing upon the Insurance Bill by Dr. John Inglis shows one aspect of it. Haste and rush are commendable when a fire has to be overcome, but when laws and regulations with abiding results are framed, time and calm judgment are needed.

NAVAL MATTERS—PAST AND PROSPECTIVE.

(From our Own Correspondent.)

Portsmouth Dockyard.

The most interesting event of late was the departure of their Majesties the King and Queen for Malta, which took place on November 4th. The Royal yacht *Victoria and Albert*, which was painted pure white, was escorted by the cruisers *Drake*, *Cornwall*, *Natal* and *Duke*, these being painted light grey. A few days previous to this we had a visit of inspection from the Lords of the Admiralty. Mr. Winston Churchill, the new First Lord, crossed over to the submarine depot at Fort Blockhouse and embarked in Submarine *D 5* for a trip down the Solent. Rear-Admiral Briggs, the Controller of the Navy, with Sir Lewis Mackay, the Director of Dockyards, received deputations at noon. In the afternoon the Lordships landed from the Admiralty yacht *Enchantress* and divided into parties, one of which, with the First Lord, made a tour of the yard, while the other members of the Board inspected the naval establishments. An official dinner was given on board the yacht in the evening. An intimation was issued later that the further inspection arranged to take place was postponed and their Lordships returned to London. On the 10th the First Lord, with his secretary, Rear-Admiral Bentinck, Commander and Mr. Churchill boarded the torpedo-destroyer *Swift* and went for a trip past the Nab lightship and round the battleship *King George V.* It has been placed under the question whether on Nov. 8 instead for her trials to be fitted on board and the side armour plates to be taken. The battleship *Queen* is receiving her finishing touches. She will it is understood, be the flagship of the rear-admiral second in command of the second Division of the Home Fleet. It was expected when the vessel carried out her gunnery trials that her heavy broadsides so damaged the gun mountings of her secondary armament that they threatened to make her quick guns useless. Dr. Macnamara mentioned in the House of Commons stated that one 4-inch gun mounting was purposely exposed to the greatest fire possible. Very slight damage was done, the oil bath casing of the training gear being displaced. No other damage was done and the 4-inch gun generally was in no way rendered inoperative. The battleship *Vengeance*, the flagship of the Commander-in-Chief of the Home Fleet, has come in for a refit. The reports to the cruiser *Hawke*, which was damaged in collision with the liner *Olympic*, have been taken in hand and the work will probably occupy about three months. A straight bow is to be fitted instead of a ram like that which the vessel previously had. The cruiser *Drake*, which recently completed a thorough refit, is to be commissioned on November 30th to relieve the *Powerful* as flagship on the Australian Station. As the Royal yacht *Victoria and Albert* will not be required this winter advantage is to be taken of her period of overhaul to thoroughly renovate the state apartments. The battleship *Albion* has been paid off for a refit. The destroyers *Haughty* and *Racket* have also been paid off and are being prepared for sale. Rear-Admiral Meggeridge has taken command of the local division of the Home Fleet, succeeding Rear-Admiral Lumsden, and has hoisted his flag in the New Zealand which vessel is to be renamed the *Lion* on December 1st. It is interesting to note that Sir Warren Smith, the new Director of Naval Construction, entered the service as a dockyard apprentice here half a century ago.

Devonport Dockyard.

The Admiralty yacht *Enchantress* arrived here on November 1st with the Lords of the Admiralty on board, including Mr. Winston Churchill, the new First Lord. Next morning a tour of the yard was made, visits being paid to the battleship *Centurion*, the new torpedo-boat destroyer *Swift*, the Victualling Yard and the North Yard. In the afternoon the naval establishments were visited and in the evening their Lordships gave an official dinner on board the yacht. On the 4th the inspection continued and at night their Lordships returned to London. A fortnight later Mr. George Lambert, M.P., the Civil Lord, accompanied by Sir Lewis Mackay, the Director of Dockyards, and several Admirals of Dockyards, were received. The battleship *Centurion* was launched on the afternoon of November 10th. Mr. Winston Churchill was on the yard, performing the launching ceremony. The First Lord was having great pleasure to witness the launch. A contingent of about a large party of his colleagues, from the Commons, accompanied him, going to Messrs. Fairfields Brown & Company's yard on the Clyde. The vessel is to be completed by February 4th. [illegible] during the construction of the battleship, which is identical to that class. Some [illegible] the trials of the cruiser [illegible] The official trial of the vessel is to have taken place early in November, but it is stated that it is to be postponed [illegible] it was found to be roughly cut in [illegible] Since then Consulting Engineers have been to Devonport and have to confirm their opinion [illegible] so as to prevent waste of steam. The vessel has been fitted with new equipment and the new mountings have accompanied equipment, which will give an illuminating power of [illegible] candles. It is not expected that the vessel will arrive at her station until the third week in December, which will be nearly two months after the date fixed for her departure. It is understood that the *Lion* will come to Devonport and will take the place of the *Indomitable* as flagship of the First Cruiser Squadron. The new battleship *Monarch* arrived on November 10th from the Clyde to be equipped preparatory to commencing her trials. The *Monarch* is expected from the Clyde for the same purpose in December next. It is expected that the new cruiser *Boadicea* will not be able to take her place in the Atlantic Fleet until the middle of December. The vessel was commissioned at the port on October 24th and subsequently proceeded to Birkenhead, but on her way developed serious defects. She returned here and the defects are now being put right. The after-repair trials of the cruiser *Europa* have proved satisfactory and the vessel will shortly be commissioned. It is believed that she will be acquired by the Commonwealth of Australia for training purposes. The sloop training cruiser *Cornwall* has started on the preparations for her eventual voyage. She left here in May, and after cruising for a couple of months was sent to the assistance of the stranded Canadian cruiser *Niobe*, when the *Cornwall* also got aground, but eventually both vessels were floated and reached Halifax. The *Cornwall* sustained rather serious damage and was temporarily repaired at Halifax. The disaster took place when entering the Sound on the night of November 10th, coupled with an extremely hard passage she has made on the part of a hole being made good on her keel. The *Niobe* had been in dock at Greenock for a number of months undergoing repair in consequence of a collision with the *Dublin* nearly three months ago and she was only just returning to this port.

Chatham Dockyard.

The launch of the month has been the launch of the cruiser *Chatham*, the launch of which was held on January [illegible]. The launching ceremony was performed by Lady [illegible], wife of the Lord Lieutenant of Kent. A novel feature of the launch was the launching of a small balloon filled with confetti over the vessel, the confetti falling over the spectators. Her Ladyship was afterwards presented with a bouquet of the vessel and an oaken casket containing the flower and stem used in the ceremony. The *Chatham* is the first ship to be launched of a new type of cruiser, which is to be known as the "Falmouth" class. Her dimensions are:—Length overall, 456 ft. 6 in.; [illegible] The other two cruisers are the *Dublin* and *Southampton*, which are building in private yards, while the *Melbourne* and *Sydney* building for the Australian Government are of the same class. The *Southampton* is the flagship of the Second Cruiser Squadron, the same as the *Chatham* will be. She was, it is interesting to note, the last large vessel launched [illegible] The *Chatham* is the first ship of the Fleet Cruiser Squadron [illegible] arrived for her preliminary trials, and, since then, the principal [illegible] the trials have shown [illegible] the damage sustained, and they are right [illegible] The [illegible] Home [illegible]

which had been employed for the past seven months on the North Sea survey has come in to be berthed in the steam basin for the winter months and the *Lyra* has also arrived. The latter vessel has been occupied during the season in taking soundings of the new channel leading from the Nore into Sheerness Harbour and also on surveying work in the Thames estuary and at Dover. The surveying officers have been allotted an office in which to work up the results of their season's work for the preparation of new charts. We shall shortly be losing Mr. E. Bate, senior constructor, who has been selected to succeed Mr. W. Hockaday as chief constructor at Hong Kong. Mr. Bate has been here six and a half years and he is now in charge of the construction of the *Chatham*. The successor to Mr. Cartwright Reid, the superintending civil engineer, who is to take charge of the work at Rosyth, is to be Mr. H. Oakley, superintending civil engineer at Hong Kong, and he will take over the duties at the beginning of the new year.

Sheerness Dockyard.

We have plenty of repair work in hand. The *Thrasher*, of the Devonport Destroyer Flotilla, has been docked for the replacement of a damaged plate on the port side below the water line abaft the coal bunkers where she had been struck in a heavy seaway by the hydroplane of Submarine *C* 10, which she was convoying from Harwich to this port. The *Thrasher* has been put right and has gone on to Devonport, and Submarine *C* 10 has since come in for repair. Submarine *C* 26 has also come in for a refit from Dundee. She had a very stormy voyage and took four days on the journey, being convoyed by the destroyer *Teazer*. Another vessel has come in for repair. Early on the morning of November 15th the vessels of the First Destroyer Flotilla were returning to Harwich from exercises in the Channel, when a collision occurred between the *Scorpion* and the Danish sailing schooner *Fyn*. The destroyer had a hole made abaft her engine-room and she also lost one of her funnels. She was taken in tow by the *Renard* and brought to this port. The schooner was subseqently found waterlogged and abandoned near the Goodwins. The torpedo-gunboat *Jason* has been taken in hand for a long refit, which is to include the retubing of her water-tube boilers. The destroyer *Erne*, which recently came into dockyard hands for the repair of damage sustained in collision with the destroyer *Wear* at Harwich, was placed in dock within three hours of her arrival. Her stem piece for a considerable distance was bent over to port and a new stem piece and some new plates are being fitted. She will be out of hand very shortly. The *Recruit* has completed an extensive refit and has been commissioned for service as senior officers' destroyer in the Nore Destroyer Division. She has relieved the *Dasher*, which has been placed in charge of a care and maintenance party to be prepared for sale. Torpedo boat *No.* 113 has been paid off for her boilers to be retubed, and *No.* 111 has completed refitting and has rejoined the Nore Destroyer Division. Submarines *C* 2, *C* 3 and *C* 6 have also completed their refits and on November 10th proceeded to Harwich to rejoin Section 3 Submarine Flotilla. Harwich is in future to be the mooring base of the destroyers of the Nore Flotilla, moorings having recently been completed there for twenty destroyers. We shall lose our captain-superintendent on December 1st, and on that day Captain Torlesse will be succeeded by Captain Prendergast, from the battleship *Implacable*, in the Atlantic Fleet. It is an interesting fact that Gillingham's new mayor, Councillor J. Davis, served for over forty years in this yard and at Chatham. He came to Sheerness as a trade boy at the age of fourteen and subsequently served as a smith for two years, when he was transferred to the Naval Store branch. He went to Chatham in 1883 as foreman of storehouses.

Pembroke Dockyard.

The cruiser *Active* has returned on the completion of her trials, which are said to have been exceedingly satisfactory. The horse-power should have been 18,000 according to the contract, but it worked up to 21,000 during the full-power trial, and the maximum speed over the measured mile was at the rate of about 26 knots. With regard to the cruiser *Amphion*, defects have been discovered in one of the cast steel shaft brackets and it is probable that a new bracket will have to be fixed. The launch, which had been fixed for December 4th, may therefore have to be postponed. The bracket has been built into the ship and bored for the propeller shafting. Our new vessel is to be built in No. 1 slip, and the first keel plates were laid on November 15th. The delay in laying the vessel down was due to the non-delivery of the material for making the keel plates. Plates are supplied to us and they have to be bent to shape after delivery. They are always bent cold at this yard under a hydraulic press, and in the process one was fractured. This, of course, necessitated an investigation and there will probably be some delay in manufacturing the plates. The captain-superintendent must have been highly gratified when informed by the Admiralty that it had been brought to their notice that the unarmoured cruiser *Blonde*, which was built at this yard and commissioned in May last was completed for less than the estimate of cost. My Lords therefore congratulated the yard officials concerned. Captain Mundy will leave us on December 5th, when he will be succeeded as superintendent by Captain Grant. Captain Mundy came here three years ago, and he was at that time about sixty down the captains' list. He is now fourth, and before very long he should be promoted to rear-admiral.

THE FLEETS OF THE MAIL LINES.

(*From our Own Correspondent.*)

The Dangers of the St. Lawrence.

THE experience of navigators, shipowners and underwriters in the past has shown that the River St. Lawrence, beautiful though its scenery undoubtedly is, has proved somewhat of a death trap, as far as shipping is concerned. The natural result has, of course, been that to some extent the rates of insurance for vessels trading to ports on the river has been high. But those interested in the prosperity of the ports of Quebec and Montreal have never ceased, during the last decade at least, to work for the improvement of the river itself, and for the provision of every safeguard to navigation which modern science can suggest. They have had their reward in one thing. Such vessels as the *Megantic* and *Laurentic*, of the White Star-Dominion line, now pass safely up and down the river, though even towards the end of the last century the limit of safety would hardly allow steamers of one-third their size to be engaged in the regular St. Lawrence trade. Within the last ten years, the old equipment of the lighthouses has been modernized with the latest types of lights and fog sound-signals, whilst the newer discoveries in the way of submarine bell-signals and wireless telegraphy have been pressed into the cause of safety. Meanwhile the navigable channel has been deepened from 27½ ft. to 30 ft., and it has at the same time been extended till it has a minimum width of 450 ft. Thus it is claimed that the once-dreaded "dangers of the St. Lawrence" are no more, and that there is no reason why the trade should any longer be hampered by what those interested allege to be excessive rates for insurance. The President of the Montreal Harbour Board has just issued a pamphlet in which the enterprise of the Canadians in improving their great waterway is set out with justifiable pride. Major Stephens, the writer of the book, refers to the extent of their work, empha izing his points by a comparison of the present condition of the river with that of but ten years ago, and puts forward an earnest plea for a lessened rate for underwriting vessels traversing these waters.

The South African Mail Service.

An extraordinary rumour as to the future of the Union-Castle Steamship Company was rife at the middle of November. As I think most readers must be aware, the present contract for the conveyance of the mails between this country and South Africa runs out in another twelve months, and the Union Government has called for tenders for a new service. In its advertisements it announced that 'no tender would be entertained from any proposed contractor who would not bind himself to refrain from the existing practice of giving rebates on freight. Accordingly the Union-Castle Line—loyal to its allies in the South African conference—did not send in any offer, and shipowners generally—recognising the fact that Messrs. Donald Currie & Co. were fighting the battle of shipowners in every regular trade—refrained from tendering either. So only one offer was sent in in response to the advertisements. To be accurate, I believe,

three alternative offers were submitted but all three came from one source—and that was not a shipping company but a private individual. Even the officials of the Union Government realized that they had not got the best at once that would be much use to them, and they did not accept it. So now they are in the position of having less than a year to run under the present contract and nothing to take its place. They talk heavily enough of building and running their own mail fleet to do the work, airily explaining that the needful ships could be provided for a trifle of 3½ millions sterling. Possibly they may be so. But there are no ships suitable for the service on sale at the moment nor are there likely to be. For instance the Union-Castle Company's fleet vessels really adapted to the trade do not exist. Eleven months is not a long time for the construction of mail steamers and for the organization of a mail service. Moreover the management of a shipping venture is not quite so easy as the majority of civil servants seem to imagine. It would be difficult to get the men to work the undertaking, even if the ships could be provided, whilst there is the further unpleasant fact to be reckoned with, that between the lines it is the Government line would meet with deadly opposition from the Conference Companies, and not the least from Messrs. Donald Currie and Co. So much for the rumour that the property was given away for the South African Government had purchased the Union-Castle fleet and would run it itself. The story was evidently accepted on the Stock Exchange when it came out, for the shares of the Company jumped upwards. But the rumour was soon denied and the future of the South African Mail contract is still on the knees of the gods.

The Royal Tour.

Just prior to the commencement of the Royal Tour to India it was announced in the Times that the *Medina* has been listed in the Admiralty record as ship No. 308, of 12,500 tons and 15,000 I.H.P. [illegible] flagship. In [illegible] Speaking at Rear-Admiral Sir Colin R. Keppel's [illegible] I believe that the gross tonnage of the *Medina* is in fact about [illegible] But she is now treated as a Royal yacht. She flies the White Ensign. She is spoken of as H.M.S. *Medina*. She is even something to the words I have quoted in the Navy List. Then why, may I ask, not give her her displacement tonnage, as is given in the case of other ships in the same list? Surely there is someone at the Admiralty who is capable of calculating the displacement of such a vessel at her service draught. If there be no such person, there is certainly someone at the P. & O. office in Leadenhall Street or at the Builders' yard, who could furnish the necessary figure. It may seem a small thing, but I attach some importance to it, and for the reason. In the days when the White Star liner *Celtic* was the largest mercantile ship afloat, I was more than once asked to [illegible] whether the [illegible] was [illegible] than a big battleship. [illegible] surprise was evinced when the answer was given in favour of the mercantile ship. Anyone who reads the Navy List will know that the *Medina* the biggest ship in the P. & O. fleet, appears to be of less tonnage than a not too modern pre-dreadnought. In point of fact, if she were treated on the same basis as warships, her tonnage would appear as at least equal to that of a *Dreadnought*, and people nowadays think size the one test of quality.

A Warning to Officers of the Mercantile Marine.

A curious application was made the other day to the Judge of the Admiralty Division. It was made on behalf of the owners of the towing Hamburgers of Antwerp, which, when doing so, the Dover during the heavy weather at the beginning of November, was served with process by the officials of the Court of Admiralty—the long tines within the jurisdiction of the Court and therefore liable to arrest—to answer a claim for damage alleged to have been occasioned to the Belgian steamer the Government by reason of a collision between the two vessels at Flushing some considerable time previously. The official of the Court, when serving the writ, at the tug with [illegible] directed that it should [illegible] at Dover. The tug, however, was discovered and the tug went straight across to Flushing. Her owners, who are the Salvage Association of Antwerp, set these facts before the Court and explained that they were in no way responsible for the master's act in setting at naught the authority of the High Court of Admiralty. They had ordered the tugmaster to come back again, but he took no notice of them, any more than he had done of the official, and at long gone the explanation of the state of things and tendered bail in respect of their ship. The Court accepted the statement made on their behalf and recognized that they had not in any way abetted the master in his contempt. What fate awaits the recalcitrant master if ever he is found again in the jurisdiction remains to be seen.

The Increase in Cargo Companies' Fleets.

One of the characteristics of recent years has been not only the increase in the size of individual ships but also the growth of mercantile fleets, especially of what may be called tramp companies. Some of these companies are of recent origin. But that fact does not seem to have prevented their rapid extension. Take for example the fleet of one company whose headquarters are at Hull and whose ships are called by names similar to and in most cases identical with those of the more famous White Star Line of Liverpool.

The fleet of Messrs. W. H. Cockerline & Co. has increased rapidly indeed. In the Register for 1901-2 they were credited with but a single vessel, the *Peach*, which has been disposed of during the present year. The number of their vessels has soon become important, as witness the following table of their present fleet:

Ship.	Year built.	Builders.	Gross tonnage.
Graphic	1902	R. Dixon, Middlesbrough .. .	3,205
Olympic	1903	Irvine's, Hartlepool	2,217
Britannic .	1904	W. Gray, Hartlepool.....	3,487
Majestic ..	1904	Irvine's Hartlepool	3,027
Atlantic	1904	W. Gray, Hartlepool.....	3,016
Adriatic	1904	Irvine's Hartlepool	3,028
Germanic ..	1905	Irvine's, Hartlepool	3,377
Teutonic	1905	W. Gray, Hartlepool.....	3,664
Corinthic ..	1905	R. Craggs, Middlesbrough	3,686
Athenic	1906	Sunderland S.B.Co.	4,078
Cambric	1906	Sunderland S.B.Co.	3,403
Republic .	1907	Sunderland S.B.Co.	4,281
Asiatic	1907	Sunderland S.B.Co.	3,889
Gothic . . .	1914	Furness Withy & Co. Hartlepool	3,501

The last-named vessel was formerly the *Bessborough*, and was purchased by Messrs. Cockerline's and renamed in 1910. The White Star Line never had a *Pacific*, though the famous Collins Line used the name. Nor is the Liverpool Company likely to select *Atlantic* as a name for any of its future ships. *Cambric* is a designation that has never been borne in the White Star fleet. But all the other names are familiar, though it will be observed that some of them—notably that of the *Olympic*—were in use on the Humber long before the Mersey claimed it.

A Shipmaster and some Stowaways.

A curious story comes from Port of Spain. I take the facts from the *Journal of Commerce*. The vessels of the Royal Mail Steam Packet Company have for some time been troubled by large numbers of stowaways who apparently force their way on board the steamers in spite of the efforts of both the crews and the local police. Once aboard they are practically safe from arrest or detection for there are many of their own colour and class proper [illegible] to look passengers and the attempt to identify those who have come surreptitiously aboard is practically impossible. Last [illegible] it appears they seems to have struck one shipmaster, Capt. G. S. Guillard, of the s.s. *Thames*. He prepared a bucket of red and sticky paint and awaited developments. As they came on deck they were seized to the number of about twelve, and the paint was applied to their [illegible] faces. Then the master's point of view all serious and [illegible] the release of the other [illegible] were expected and no complaint was [illegible] to be preferred. But the master of the [illegible] seems to have [illegible] to look ahead. [illegible] Captain [illegible] had taken the law into his own hands and had committed an assault upon the stowaways. His action in handing them over to the police and [illegible] making them shows that he was well aware

of the fact that there is no legal course to pursue against such offenders. He chose an solution to do what no doubt appeared a very smart thing. But he was clearly guilty of at least a technical outrage on the men. He not only assaulted them, but further held them up to the derision of their friends and neighbours. Already one of the sufferers has obtained a verdict for his damages for the assault, and other suits are pending. The Steamship Company, however, stood by its officer and has entered an appeal. So that further comment at the moment is not desirable. But I notice the case because it may interest engineers, for we have been told that ships' engineers ought not to be entrusted with the task of maintaining discipline amongst the members of their own department. I personally can hardly imagine an engineer of any experience being so little able to realize the responsibilities of his position and the rights of the subject generally as to take such a course as that which commended itself to Captain Guillard in the month of July last. The story savours rather of the long past days of Midshipman Easy than of the prosaic times of the twentieth century, when every man is as good as his neighbour (and, in the opinion of some sea-lawyers, better too.

The Oil-Engined Ship.

It is announced that the German American Petroleum Company has placed an order with Messrs. Krupp for three twin-screw Diesel-engined tank-steamers. Of these ships, one is to have a capacity of 15,000 tons of oil, the two sisters being but half her size. Meanwhile the largest sailing vessel in the world, a five-master to be known as *La France*, has been launched at Bordeaux. This vessel is of 11,000 tons displacement and 6,500 tons gross register. She too is to have twin-screw Diesel engines for auxiliary purposes. This seems at first sight to be a reversion to an ancient practice and one that, when tried, proved a failure, for there were several attempts at the use of auxiliary steamers as long ago as the forties. But it is contended that the oil-engine takes up so much less room and requires so much smaller a staff to manage it that the old objections to an auxiliary equipment no longer apply. Indeed, the experience of the four-masted auxiliary barque *Queville*, of Rouen, is said to show that in actual practice the Diesel-engine, fitted as an auxiliary, is of great advantage to the big sailing vessel.

WHITE STAR LINE.

THE report that the White Star Line has placed an order with Messrs. Harland & Wolff for a vessel of bigger dimensions than anything afloat or building, while lacking confirmation in official quarters, has had colour lent to it by the fact that the Belfast Harbour Commissioners have under consideration the question of widening the entrance to the new graving dock. There is no doubt that the White Star Company contemplates the ordering of another steamer of big proportions; and it may be taken for granted that the dimensions will be such as to entitle her to be called "the biggest vessel in the world." The present width of entrance of the graving dock in question is 96 feet, and the Commissioners propose to increase this to 100 feet. The extreme length is 887 feet, and when the dock was being constructed provision was made for lengthening at a comparatively small cost; the top end is, as a matter of fact, merely of a temporary nature. Should the necessity for widening the entrance and lengthening the dock arise in the near future, the harbour authorities may be relied upon to do what is requisite. In the May issue of *The Marine Engineer* it was pointed out that the *Olympic* completely filled this dock, and that no vessel of appreciably bigger dimensions could enter it. It seems clear, therefore, that, although it is some years since the building of the dock was first started upon, the Commissioners did not then look far enough ahead in deciding upon the size of the dock; more especially so in view of the fact that it is now a great many years since Lord Pirrie predicted that a vessel 1,000 feet long would yet be built, and that, possibly, in his own day. There appears to be every prospect of his prophecy being realized within the next two or three years.

SHIPPING ON THE GREAT LAKES OF AMERICA.

By Mr. A. E. Jordan.

THE Great Lakes of America should be seen to be really appreciated; it is perhaps difficult to realize the enormous amount of traffic which is confined to their waters unless one has seen them for himself. Lake vessels, however, carry more tonnage under the American flag than all the others in the United States put together, and the figures given hereafter will give an idea of the vast commerce on this inland sea of fresh water. The Nett Registered Tonnage of the vessels which passed through the Suez Canal in 1910 was 16,311,955, whilst that of those through the Detroit River during the lake season of 1910 (eight months) was 58,821,282.

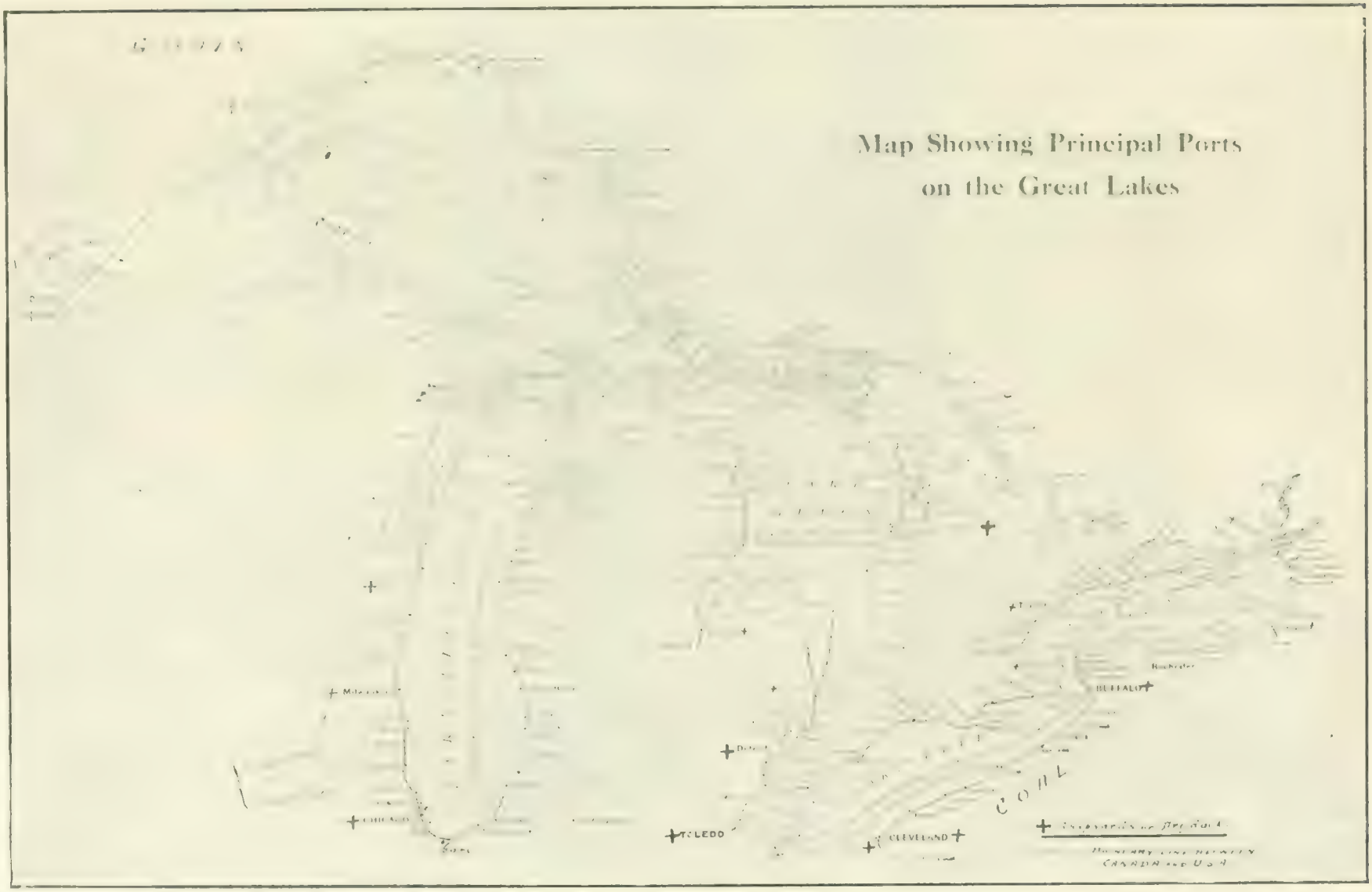
The approximate sizes of the different lakes, length and greatest width in statute miles are:—Superior, 350 × 150; Huron, 230 × 140; Michigan, 330 × 77; Erie, 240 × 55, and Ontario, 190 × 50. The larger vessels, however, are unable to get into Lake Ontario on account of the size of the locks in the Welland Canal, these not being able to take vessels over about 260 feet in length. The water surface of the Great Lakes is about 90,000 square miles and the distance from Buffalo at the eastern end of Lake Erie to Duluth at the head of Lake Superior about 1000 miles.

The volume of commerce which passed through the Soo Locks to and from Lake Superior only, for the years 1909 and 1910 was as follows:—

	Season 1910	Season 1909
Steamers, number	17,674	16,463
Sailing Vessels, number	1,890	1,787
Unregistered, number	1,335	954
Total number	20,899	19,204
Lockages, number	14,569	13,571
Nett Registered Tonnage	49,856,123	46,751,717
Freight, short tons (2,000 lbs.)	62,363,218	57,895,149
Passengers, number	66,933	59,948
Hard Coal, short tons	1,658,844	1,412,387
Soft Coal, short tons	11,854,883	8,527,639
Flour, barrels	7,576,789	7,094,175
Wheat, bushels	86,250,074	113,253,571
Grain, bushels	30,245,485	46,519,451
Manufactured and pig iron, short tons	444,669	522,281
Salt, barrels	528,610	651,011
Iron Ore, short tons	41,603,634	46,014,078
Copper, short tons	148,070	127,212
Lumber, 1,000 ft. Board measure	603,101	552,380
Building Stone, short tons	9,635	1,784
General Merchandise, short tons	1,411,549	1,140,344

The season of 1911 has been a rather bad one for the Lake trade, the freight carried up to September 1st being 31,488,323 tons, against 40,046,800 for the same period in 1910. The season of navigation on the Lakes is about eight months, from April to December. Early in December the ice commences to form in the rivers and straits, especially in the North, the Straits of Mackinac and the Soo River soon becoming frozen up solid, which stops all traffic to Lake Superior and it is usually the end of April before all the ice gets away. The level of the different Lakes varies considerably. Lake Superior is 602 feet above sea level and Lakes Huron and Michigan 581 feet;

*Contributed to The Institute of Marine Engineers on November 27th, by Mr. A. E. Jordan (Member)


Map Showing Principal Ports
on the Great Lakes
BUFFALO
TOLEDO
CLEVELAND
COAL

between Superior and Huron there are locks, two of these, the Poe and the Weitzel locks, belong to the United States, and one, called the Canadian lock, to Canada; the latter is the largest and last year handled 58 per cent. of the tonnage. There are no dues to pay for any of the locks nor are there any light, harbour, pilotage, port dues, etc., payable by vessels anywhere on the Lakes.

Lake Erie is about eight feet below Huron, the difference in the levels being taken up in the St. Clair and Detroit Rivers, where there is a current running down into Lake Erie, no locks being necessary. The level of Lake Ontario is 247 feet above the sea and 326 feet below Lake Erie; the famous Niagara Falls at the eastern end of Erie discharging the surplus water into the Niagara River, which runs into Lake Ontario. There are 25 locks in the Welland Canal in Canada, which goes from Port Colborne on Lake Erie to Port Dalhousie on Lake Ontario, through which vessels not longer than about 255 feet go, generally laden with grain from the ports on Lakes Superior and Michigan to Montreal; the majority of the lake vessels, however, are unable to go east beyond Buffalo on account of their size; they are built on the Lakes and when a bad season comes along they have to be laid up; in 1908 a number of vessels did not make a single trip all the season. The following table gives a comparison of the total Lake traffic which passed through the Detroit River from 1902 to 1910.

Year	Number of passages	Freight, Tons.	Estimated value
1902	33,000	44,260,506	$44[illegible],834,640
1903	33,113	46,817,245	471,917,830
1904	29,472	42,792,326	453,598,656
1905	35,599	55,508,360	522,888,751
1906	35,128	63,808,571	662,971,053
1907	34,149	71,226,895	697,311,302
1908	27,883	54,086 750	614,425,480
1909	32,296	67,789,369	732,803,079
1910	33,638	73,526,692	771,294,055

The average freight rates for the ten years ending 1910 were as follows:—

	Cents.
Iron ore, from head of Lake Superior to Ohio ports (gross ton 2,240 lbs.)	74½
Iron ore, Marquette to Ohio ports	67½
Iron ore, Escanaba to Ohio ports	57½
Soft coal, Ohio ports to Milwaukee (nett ton 2,000 lbs.)	43½
Soft coal, Ohio ports to Duluth	31
Hard coal, Buffalo to Chicago	43
Hard coal, Buffalo to Duluth	33½
Wheat, Chicago to Buffalo (bushel)	1 46
Wheat, Duluth to Buffalo	1 84

Iron ore is F.O.B. and 15 cents per ton is paid by the ship for discharging. $4.12½ per 1,000 bushels is paid by the ship for shovelling, trimming and tallying grain. Coal is handled in and out without chagre to the ship.

The lake freighter differs considerably from vessels built for ocean traffic. The draught and beam are fixed by existing conditions; the draught is limited to 18 to 19 feet to and from Lake Superior and about 20 feet for other parts, owing to the shallow places in the waterways connecting the different lakes, and the beam by the width of the entrances of the Canadian and Weitzel locks, which will not admit vessels of over 60 feet; the Poe lock has gates 100 feet wide, but should anything happen to it a vessel over 60 feet beam could not get into Lake Superior; moreover the discharging berths are built to handle vessels not exceeding 60 feet, so that this is at present the limit, most of the larger vessels being 58 feet beam. The largest boats are 605 feet long over all, 58 feet beam, 32 to 33 feet deep and can carry 12,000 tons; their lines are necessarily very full and they have practically flat bottoms; they have 36 hatches which are about two-thirds of the vessel's beam and are 12 feet apart centre to centre fore and aft; the hatch covers are made of steel-plate flanged at the ends and telescope over each other from the centre to port and starboard sides of the hatch, being handled by wires led to the mooring winches.

The deck is perfectly clear from forecastle to poop, there is no cargo-handling gear on board, the only machinery on deck being mooring winches. The pilot house (wheel house), captain's quarters and navigating bridge are right forward on a high forecastle deck, with accommodation for deck officers and

Stern Frame of Passenger Steamer, 233 ft. long, 40 ft. beam

part of the crew under this deck. Many of the vessels have fine accommodation for three or four passengers; the quarters for officers and crew are all well fitted up and as a rule have shower and tub baths, the captain's rooms in the modern vessels are far superior to those in any cargo boat on salt water.

The engines and boilers on all the bulk freighters are aft under a raised poop, on the deck of which are berths for the engineers, greasers, firemen, etc., also the galley and mess rooms; nearly all the vessels are lighted by electricity and have telephones from the forecastle to poop, which are especially useful in bad weather.

The hold is quite clear, there being no hold beams or stanchions, but heavy, deep, arched girders are fitted under the deck between the hatches, there are generally two divisional bulkheads, but these are not water-tight, there being no water-tight bulkheads between those of the forepeak and stokehold; all the modern vessels have side tanks which run up to

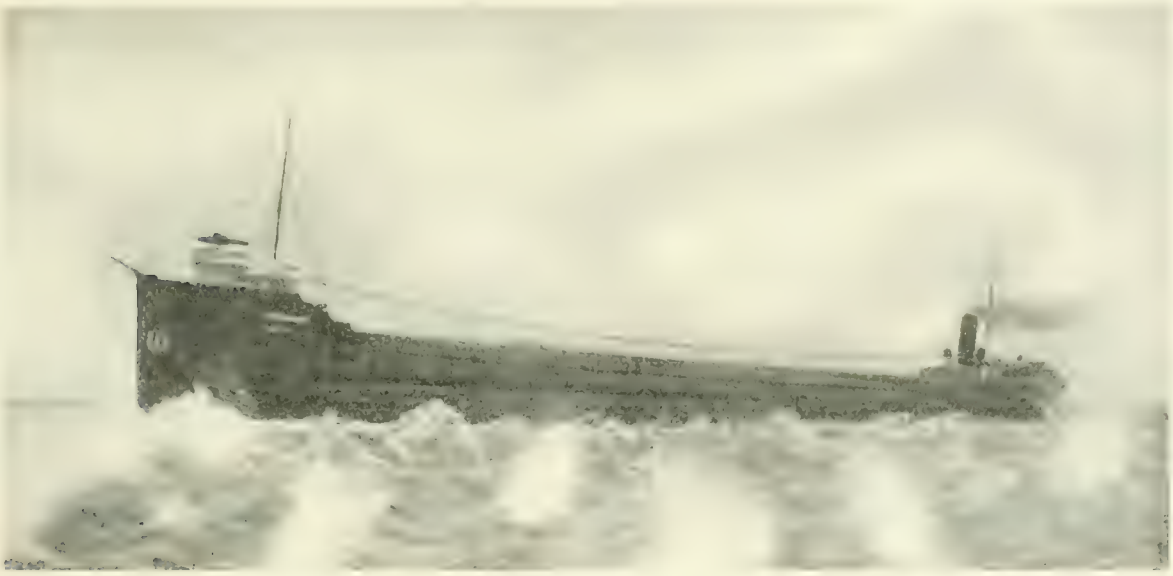
within 10 or 11 feet of the deck, as well as a double bottom which is about 5 feet deep, the side tank being in fact a continuation of the bottom tank.

The floors are made of 15-inch channel bars, the lower flange forming the frame bottom bar, they are spaced three feet apart and have a deep floor plate every 12 feet, the vessels all have flat keel plates and a water-tight centre keelson; there are usually four fore and aft plate girders on each side attached to the upper flange of the channel floor, with a continuous angle on one side and a lug on the other and intercostals between the floors connected to the bottom plating with the usual shell bars.

The tank tops have no wood ceiling and the holds no side bilges, the tank top plating (in vessels which have no side tanks) extending out straight to the side plating, heavy brackets above and below connecting the tank top plating to the side frames and to the bottom channel floors.

tank top plating with a large, shaped plate bracket; the side frame is a 9 to 12-inch channel, according to the size of the ship, and is bracketed to the deck beam and to tank top; the floors at both ends of the ship as she begins to narrow are carried up to the tank top, being bent and bevelled to suit the line of the vessel. The shell plating used is all very large, the average size of plates being from 25 to 30 feet in length and 6 to 7 feet in width.

While there are a number of fine passenger and general cargo boats, the majority of the vessels are built expressly for the iron ore and coal trade, the lake term for them being bulk freighters, the general cargo boats being called package freighters. The loading and discharging of the bulk cargoes is done with surprising despatch, the loading berths put out into the water and are so arranged that a chute can be put into each hatch, all being spaced 12 feet centre to centre; the discharging docks are fitted with over-



A Typical Lake Freighter, 530 ft. long, 50 ft. beam, 6,124 G.R.T.

In the building of lake vessels no scrieve boards are used, all the plating, floors, frames, brackets, intercostals, girders, beams and other parts are shaped and marked off from carefully made templets, called moulds, and all holes punched before any parts are erected. A set of moulds can be used for a number of vessels of the same size. It is claimed that a considerable saving is effected by the mould method over the scrieve board (nevertheless the cost to the shipowner for a vessel built at any American yard is greater than for one of the same size built at home) and that the work is done much more quickly. The time for building say a 9,000-ton ship is sixty to ninety days from laying the keel until the trial trip is run—a number of vessels have been turned out in much less time than this; one, the *J. Q. Riddle*, built by the American Shipbuilding Co. in 1906, 552 ft. × 56 ft. × 31 ft., was completed in forty-five days.

For over three-quarters of the length the bottom floors are all the same, straight lengths of 15-inch channel, the turn of the bilge being formed by an angle bent to shape and joined to the floor and to

head travellers from which grabs, called clam shells, are worked, the latest pattern, named the Hulett, after the inventor, lifts 15 tons at each hoist.

All the discharging machinery is operated by electricity, and in August of this year a vessel loaded with 10,234 gross tons of iron ore was discharged at Ashtabula in four hours and six minutes with four 15-ton Hulett machines, the average tons per hour per machine was 637·6 and the average tons per hour from start to finish for the four machines was 2550·5 tons. Unloading commenced at 6.30 a.m. and was completed at 10.36 a.m., this being a record for discharging; the record for loading is 10,111 tons of ore put into a vessel in thirty-nine minutes. These of course are record times, but in any event the usual time to load is not more than two or three hours and to discharge from six to twelve hours. Lake vessels have an advantage over their deep sea brethren, as the captain has practically no ship's business to attend to ashore, so that as soon as the vessel is loaded or discharged she can get away. Vessels have made as many as thirty-eight trips during the season by

going up light and only carrying ore from Lake Superior to Ohio or Lake Michigan ports; an average number of trips for a vessel taking a cargo both ways is about twenty for the season of eight months, or about twelve days for each trip, two cargoes being handled in and out; the longest passage, from Buffalo to Duluth, takes about four days.

The wages paid on the lakes are high compared with those on deep sea vessels, but the cost of everything in America is so much greater than at home that I do not think the men are much better off in the end. The captain gets from £400 to £500 a year, all other pay being monthly: chief engineer about £35, assistant engineer £25, mate £27, second mate £19, wheelsmen (quarter masters) £10, greasers and firemen £10 10s. to £11 10s., and deck hands £6 6s.; all provisions are found by the ship and all hands are well fed.

The machinery in all the freighters is fitted aft, the boilers are of the usual return multitubular type and call for no comment, the engines are nearly all triple-expansion, three cranks, and not having salt water to contend with they all have jet condensers; no copper pipes are used; the main and other steam pipes are steel and water pipes ordinary iron piping with screwed connections. The method of fitting propellers is somewhat curious to us; a large number of the tail shafts are parallel, the propeller is bored an easy fit and keyed on with a fitted, driven key; then a heavy band shrunk on the end of the shaft. Comparatively few of the shafts have cone ends with fitted propellers secured with a nut; there are no brass liners on the tail shafts and no corrosion takes place, and as the vessels are laid up for about four months every year there is no necessity to draw the shafts for periodical inspection. The stern bush is made very long and is generally cast iron or steel filled with lignum vitae, usually having white metal run between the strips. It is fitted so that it can be removed for re-wooding without drawing the tail shaft or removing the propeller. The after-coupling is disconnected and shaft and propeller jacked aft a sufficient distance to allow the bush to be drawn out; the bush itself is made in halves and in three or four lengths connected together with dovetail or figure 8 keys, and has tapped holes in the after-ends of each section for draw bolts. The stern frame of lake vessels lends itself to this operation as it has no rudder post, the weight of the rudder being carried on a bearing collar on deck and a bottom pinlte, which goes into a bushed hole in the overhung sole piece of the stern frame, steadies the rudder and keeps it central. These rudders are huge balanced affairs often 8 feet wide. They can be disconnected on deck and turned at right angles to the ship, which gives plenty of room to get the propeller and shaft sufficiently far aft to allow the sections of the stern bush to be drawn out. After the latter has been replaced the stern tube is filled with heavy black oil and kept full with an oil pump. These bearings run for several seasons without requiring re-wooding, and give no trouble. Most of these vessels can easily be tipped sufficiently to get at the stern bush, so that re-wooding is often done afloat; built propellers are the rule, and when a new blade has to be fitted this is also done afloat.

The engines of any of the bulk freighters seldom develop more than 2,000 I.H.P. A typical case is a vessel 504 feet long and 54 feet beam, which carries 9,000 tons and has engines 23", 38" and 63" with 42" stroke, developing about 1,050 I.H.P. and running about 10 statute miles on a consumption of 1·7 lbs. of coal per I.H.P. per hour. As soon as the season of nagivation is over, early in December, the vessels are taken to winter quarters and laid up, the machinery is all opened out, cylinders, etc., drained, all working parts oiled and sea cocks filled with heavy black oil to keep out the frost.

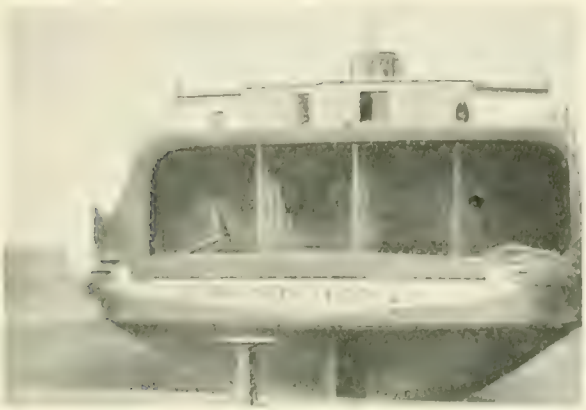
The Southern end of Lake Michigan and the Detroit River are kept open all winter. One of the distinctive features of the Lakes, the railway car ferry, runs all the year round. These vessels are specially built for breaking ice, and carry complete trains (without the locomotive). The car deck is fitted with three or four sets of rails and the after-end of the deck left open so that she can be backed against the end of the railway tracks and coupled up in line with the rails, the car slip being raised or lowered to suit. The cars are then run on to the deck and secured with dogs. Some of these car ferries are fine twin-screw boats with an

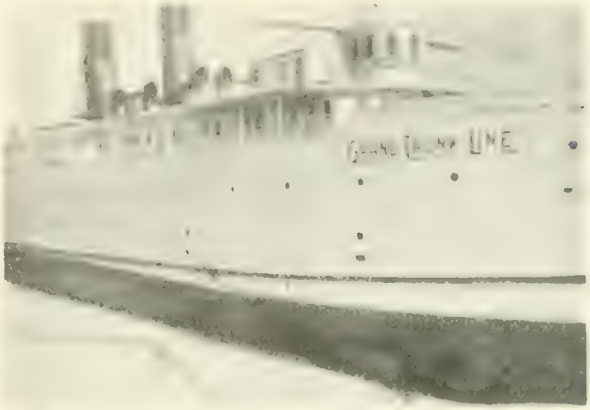
Kidd's Patent Anchor Pocket

upper deck fitted with cabins for carrying passengers, several of them running across Lake Michigan, a distance of over 70 miles, their cargo consisting solely of freight trains. There are also ferries for taking passenger trains from Detroit to Windsor, about half an hour's run across the Detroit River, but they are now building a tunnel under the river there for the Canadian Pacific, one being already in operation from Sarnia to Port Huron on the Grand Trunk Railway, so that trains can run between Canada and the States without using the ferry.

The package freighters are in most cases owned by the Railway Companies, and pick up cargo from the different railway terminals. They have large side doors through which the cargo is wheeled on hand trucks from the railway cars, the boat's deck being nearly level with the dock; they have their engines aft and a line of shafting runs the full length of the 'tween decks, with friction drums at each hatch to handle the cargo in and out of the lower holds.

A number of fine passenger boats are run during the summer. One distinctive vessel is the whaleback steamer *Christopher Columbus*, which was built in 1893 for the Chicago Exhibition, and is now running daily between Chicago and Milwaukee; she is 364 ft. × 22 ft. × 24 ft., has engines 28", 42" and 70", with 42"





Lake Michigan Car Ferry.

stroke, single screw, and goes about 18 miles per hour.

The [illegible] is a paddle steamer 390 ft. × 54 ft. × [illegible] ft. [illegible] in [illegible], and runs between Cleveland and Detroit. She has compound diagonal engines with 54" H.P. and two 84" L.P. cylinders and [illegible] stroke. She is owned by the Detroit and Cleveland Navigation Company, who have a number of other passenger vessels, and have recently launched a still larger one 472 ft. × 55 ft. × 22 ft., with engines having a 62" H.P. and two 92" L.P's. with 102" stroke. There are also excursion boats running from the lower lake ports to the islands at the head of Lake Huron and to Lake Superior, the number of passengers who went through the Sao Locks in 1910 being nearly 67,000.

During the late autumn the lake region is subject to very heavy storms which cause a big sea to rise; a number of vessels have foundered, amongst them some of the 10,000 tonners, and have gone down in Lake Superior with all hands, without a vestige of them ever being recovered; it is said that this lake is 200 fathoms deep in places. In 1910, nineteen vessels were total losses and forty-nine lives were lost; ten of these vessels were burnt; four foundered, including a car ferry of over 5,000 tons; three were sunk by collision and two stranded and broke up, one of the latter being a [illegible] tonner. A very bad sea gets up which is similar to that in the North Sea. Passengers are invariably sea sick when there is much wind, and one has to be well used to these short heavy seas to go out on any of the lakes in a storm, without being affected.

A good deal of damage is sustained by the boats during the season, especially through groundings and collisions. Whenever possible the damage is patched up to enable the vessel to keep running until the season is over, so that the repairs keep the yards busy most of the winter months. All the shipbuilding yards have dry docks, of which there are about thirty over 250 ft. long, besides numerous smaller ones; sixteen of the docks are over 400 feet long, and the largest is 764 feet with an 80 feet entrance; all the graving docks are made of wood, with the bottoms heavily piled, and there are also steel pontoon docks at Detroit.

The American Shipbuilding Company has eight shipbuilding yards at various places, all of which have dry docks, and also two yards with dry docks only. The Great Lakes Engineering Company has three yards and docks, Toledo Shipbuilding Company has one, Manitowoc Shipbuilding and Dry Dock Company one and Collingwood Shipbuilding Company one. These yards build all classes of vessels, and make their own engines and boilers. During 1910 (exclusive of Canadian yards) the lake shipbuilders launched 51 vessels, 20 being bulk freighters, 3 package freighters, 2 passenger steamers and 3 car ferries, the remainder being tugs, tenders, dredgers, etc. The bulk freighters had a carrying capacity of 194,500 gross tons, five carrying 12,000 tons each, four 10,000; eight 9,000 and three 7,500. In

Lake Dry Dock at Superior.

practically all cases, lake vessels are launched sideways into a slip alongside the building ways, and in some cases they are launched into a "dry dock." Besides the above-mentioned yards, there are others on Lake Ontario, and many smaller ones which build tugs, fishing boats, dredgers, motor boats, etc.

As before stated, the majority of the repairs are left until the winter, when the boats are laid up, and often have to be done under very severe conditions; one vessel went into the dock at the Superior Shipyard on a Christmas eve, and there was so much ice in the dock, that when the water was first pumped down, we found she had over three feet of ice between her bottom and the keel blocks. She had to be floated again, steam led into her tanks, and the bottom swept with heavy booms, it taking three days to get her safely landed on the blocks; then to make the survey we had to crawl under her bottom on top of huge blocks of ice, to ascertain the damage, so that the cranes could be put to work lifting the ice away from the damaged parts before the men could get to work cutting out. The temperature at Superior goes down to 40° below zero, but the air is fine and bracing, and when there is no wind, the men can work outside with the temperature 15° to 20°, but when it gets below 15°, all outside work has to be stopped; the ice in the northern harbours and rivers gets so solid that scaffolding is erected on it, and a waggon with two horses and two or three tons of plates can be driven over it with perfect safety.

Lake vessels suffer very little from corrosion; the holds, top sides, decks and deck erections are painted, but the shell plating below the light water line is left bare, and suffers no ill effects; the insides of the tanks are not coated, nor is any cement used excepting in the fore and after peaks.

The channel floors lend themselves to efficient and economical repairs, as the damaged parts can be cut out at any point without shifting butts, new pieces fitted and joined to the existing part, with back bars of the same section, and a face plate fitted on the inside, giving the joint of a 15-in. channel, with ½-in. face plate, a sectional area of 6½ in. more than the original.

The use of pneumatic tools is universal on the Lakes; all cutting out, drilling, caulking and most of the riveting is done by air, in fact, it would be almost impossible to get the work done without it, as while there are plenty of skilled men (most of whom have come from home yards) at the larger works, at some of the smaller ones a man may be a carpenter, working to-day at the planking of a wooden vessel (of which there is still a number), and to-morrow he may be riveting up plates on the bottom of a steel boat with a pneumatic riveter, and making a very good job of it, which it is very doubtful if he would be able to do by hand.

The names given to many of the parts are very different from those we use; a propeller is called a "wheel," and when of the built type the blades are called "buckets," the cylinder cover is "cylinder head," the junk ring "follower," the tunnel "shaft alley," stern tube "stern pipe," funnel "smoke stack," the stern of the vessel the "fantail," the deck-house on the forecastle head "the texas," the stokehold "fire room," the shell plates of a boiler are "wrapper sheets," tube plates "tube sheets," front and back plates "front and back heads."

The sign # is used on all drawings, and has two meanings; when placed before a figure it signifies number, #8 means No. 8, and when placed after a figure it means pounds; a channel marked 15 in. - 33 # meaning that the channel weighs 33 lbs. to the running foot; all plating is marked in lbs. per square foot instead of the thickness in 16ths or 20ths.

It is, of course, the enormous natural resources, iron ore, copper and grain in the North and West, and coal in the South and East, which have made the growth in commerce on the Lakes so rapid, and it is marvellous when we stop to consider that in eighty-odd years Chicago has grown from an Indian trading camp to a city which covers an area of 190 square miles, with a population of nearly two and a quarter millions; it is the terminus for about thirty railways, has hundreds of miles of streets and boulevards, and buildings and shops equal to the best in New York. The other principal cities on the Lakes are Cleveland, which is the centre of the shipping business, and has a population of over 560,000; Detroit, one of the most beautiful cities in America, has 465,800 inhabitants; Buffalo with 423,700, and Milwaukee, a fine city with a population of 374,000, has about the largest engineering works, breweries and tanneries in America.

The Lakes are responsible for many useful innovations; one in particular I may mention is the Schuette Recording Compass, which keeps an automatic record of the ship's course, time it was altered, and how long she ran on each particular course; it can be fitted to any vessel with a dynamo, and can, I believe, also be worked with batteries; the English agents are Messrs. Heath & Co., Crayford, London.

Kidd's anchor pocket is another interesting patent brought out on the Lakes. Instead of the hawse pipe extending through the bow plating, a casting is fitted which takes in the anchor flukes, leaving the crown practically flush with the bow plating; this casting has a plate steel cover on the inside, on which a short hawse pipe is fitted, the upper end of the pipe being connected to the deck in the usual way.

In conclusion, I would say, that although this is not strictly an engineering paper, I hope it has been found of some interest, and should any of you be in America with a few days to spare, a visit to the Great Lakes would, I am sure, well repay the time spent.

STABILITY INDICATOR.

SINCE this useful instrument was first referred to in our pages, its utility has been recognised and its services appreciated by several shipping Companies and ship-masters. The immediate objects to be gained by the adoption of the indicator are to place within reach of those responsible for the condition of the ship in respect to sea-worthiness, an easy means of determining, when cargo is being taken on board, the maximum loads which may be stowed in different compartments and with the minimum of water or other ballast. Consequent upon attention to these objects, the behaviour of the ship under abnormal conditions of weather may be diagnosed, and caution exercised both in loading and discharging, whether at terminal ports or ports of call. We are informed that the British India Steamer *Carpentaria* has been recently measured and tested in order to be supplied with the indicator. The new pamphlet issued by the proprietors contains useful and valuable hints to those engaged in the loading and sailing of ships.

LIVERPOOL ENGINEERING SOCIETY.

Presidential Address by Mr. W. J. Willett Bruce, R.N.R.

MR. W. J. WILLETT BRUCE, R.N.R., superintendent engineer of the White Star Line and the newly-elected president of the Liverpool Engineering Society, delivered his inaugural address on November 1st.

There was a large gathering and the address was followed with great interest.

In the course of his remarks, Mr. Willett Bruce included several important subjects, which we deal with as fully as [illegible] in these columns.

Speaking of Liverpool's New Dock he said the successful application of the turbine to marine propulsion had to a considerable extent removed the limitation of the size of steamships, with the result that a marked advance had taken place particularly since the presidential address of 1905, in which reference was made to the fact that a modern port should anticipate steamers up to 1,000 feet in length, with a beam of 100 feet and 40 feet draught of water, and upon referring to a sketch shown at the meeting as portraying a section through the Canada Graving Dock, it would be seen how the shipbuilder had in five years overtaken those engineers and others responsible for the dock accommodation in meeting the demand of the shipowner for greater tonnage. At the same time it was a notable fact that the dimensions of the existing largest steamers come within 118 ft. in in length and 1 ft. 6 in. in breadth of those anticipated dimensions as given on the occasion referred to, and with the coming of the new Hamburg American Co.'s steamers of 910 feet in length, with a beam of 95 feet, the margin was still further reduced while the new Cunarder *Aquitania* would even outfigure these dimensions, and so further realize the predictions of size as given in the address mentioned. Further than this it was much to be regretted that at present there was no graving dock in the port, which could accommodate a leviathan of existing dimensions; in fact there was only one available dock in the United Kingdom and that was at Belfast. While Southampton was bringing to completion the necessary accommodation, however it was only fair to state that Liverpool was constructing a combined graving and wet dock. The ultimate success of using such a dock for a two-fold purpose remains to be seen, but when completed some two years hence it would admit vessels of the largest proportions given. This was, of course, an advance in the right direction as mitigating the unfavourable conditions, but the fact remained that such an undertaking lay dormant, though the lead had been taken by the two cities alluded to, and was only undertaken through strong representations made by important and leading shipowners directly involved in difficulties of obtaining suitable accommodation. It was unfortunate that such a condition of affairs existed, for in such a seaport as Liverpool it was essential that those responsible should lay themselves out to pursue a policy which would induce the shipping industry to frequent its accommodation by being in a position to receive the greatest and most recent productions of the shipbuilder as demanded by the shipowners, and it was interesting to note that with this in view the Port of London was anticipating remodelling her docks at an estimated outlay of [illegible] sterling. And further, such accommodation should be equipped with the most recent and capably-designed machinery to meet all and every condition and so expedite despatch at a minimum cost, such appliances to entirely substitute power for manual labour. As an example, showing an important instance as giving a very wide scope for such advances, may be mentioned the total absence of efficient equipment at the graving docks, where in some instances stationary hand cranes were installed, which were both inadequate, slow of action, and totally unfit to meet the everyday pressing conditions. Also, one efficient crane was isolated owing to inaccessibility through narrow dock passages, while another powerful crane for heavy lifts, but far too slow, was only available for graving dock work, and opportunity must be taken for E.R. lifts when on the blocks, which was done in cases of comparatively small steamers, the crane only just reaching the engine room hatch. In large steamers having high superstructures this could only be done by special preparations, such as wholesale removal of boats, top hamper, etc., so as to give the necessary drift and clearance. Such were the present conditions, which were a living reproach to the port, and much to be regretted. While upon this point it was only just to say that had those responsible endeavoured to give the same excellent facilities at the various graving docks in the same manner as they had done in the case of the floating crane service there would be no cause for complaint, but even these cranes were too slow in action, though they maintained excellent control when at work. It was imperatively necessary in the case of the new dock alluded to, namely, the Gladstone Dock, that it should be provided with the most modern and up-to-date machinery so as to cope with existing conditions.

The President dealt with the triumphal advance of the steam turbine since its first important application in 1901, as applied in the case of fast steamers, and the results of combination engines (turbine and reciprocating). Continuing he said:—For economical work in freight steamers of low speed, carrying heavy cargoes, the application of compound turbines suitably geared down with the object in view of reducing down to an efficient speed of revolutions the turbines and increase that of the propeller, has been fitted in the case of the *Vespasian*, and considerable advantages had been recorded both as regards fuel, speed, weight and space over and above the ordinary reciprocating engines. It was recently stated that out of the total horse power per annum as much as 700,000 h.p. was that of cargo vessels, which means that there is an extensive field for this particular form of propulsive power, and, further, as stated by Sir Charles Parsons at the 1911 meeting of the Institution of Naval Architects, the economical possibilities of the introduction of gearing into warships would lead to increased saving, especially at cruising speed, the coupling of the highest pressure portion of the turbine to the low-pressure shafts in lieu of direct-coupled cruising turbines, giving an estimated saving of 25 per cent. of coal consumption at cruising speed of one-tenth of the full power and 50 per cent. at one-fifteenth of the full power, giving corresponding increases in the cruising radius with the same amount of coal. Whatever mechanical objections might be raised to gearing itself, there was no reason to doubt that improved machinery and methods would be especially laid down and adopted to overcome and eliminate them in a similar manner to what was done in the case of the manufacture and construction of the turbine.

It was gratifying to note that consistent attention had been and was being given towards increasing the efficiency of the most important parts of the auxiliary machinery, which had resulted in a certain amount of success originating directly from same, as contributing towards the general success and increased efficiency.

Regarding condensers much of late had been done to this long-neglected unit, which now played so great and important a part, as giving as near as possible a perfect vacuum, which was imperative in both turbines and combination systems. To illustrate the marked improvement, recently two modern steamers, one only preceding the other by some months, came out with improved designed condensers, but in this short difference of time the last comer had a cooling surface of only 8,440 square feet for 12,000 i.h.p., and a speed of 17 knots, against the former's 12,860 square feet and 10,600 i.h.p., and a speed of 16½ knots, showing a decided advantage for the newer steamer of 34 per cent. less cooling surface for an increased i.h.p. of 13 per cent., which signified that this important advance in efficiency meant a material gain in both weight and space.

The transportation of the large quantities of fuel from the bunkers to the furnaces, combined with a reliable method of stoking, still awaited the engineers' ingenuity, but he was afraid that the difficulties to face would not be easily overcome.

Watertube boilers in the mercantile marine had not been received with favour, though there were several marine types which had stood the ordeal of practical work elsewhere, though the actual working conditions were not possibly so arduous and continuous. Sooner or later the question in the case of large liners of adopting a more compact steam generator than the old well-tried Scotch boiler would present itself, owing to the problem of producing a given power in a reduced space. Though on the other hand the question

of coal consumption would have an all important bearing as the space saved possibly might be absorbed in additional bunkers.

The advantages of oil fuel for marine purposes was gone into by the President, and he continued:—

The internal combustion engine had been receiving considerable attention during the last few years, particularly as to its application for marine propulsion and would take an important part in the reduction of fuel expenditure but it was imperative the factor of such motive power should be of such design as to warrant immunity from accident reliability of action and immediate response to urgent requirements in cases of emergency such as fog collision and navigation in confined and congested waters; also with no sacrifice of facilities for temporary repairs in case of a portion of the engines being disabled, and so allow the steamer reaching port though in a disabled condition yet without the aid of assistance from other vessels. All this the present marine engine had, and was accomplishing, and the coming substitute should be equally efficient in such details; otherwise there would be no success.

The problem of reversing was the principal objection to the employment of oil engines for marine propulsion and although it was repeatedly announced in technical descriptions of oil engines on shipboard that reversing methods were very satisfactory, detailed descriptions were conspicuous by their absence. In perfecting the reversing gear the fact should not be lost sight of that the fewer the parts adopted the more effective the result and lesser possibility of derangement. Also an important feature not as yet dealt with but in the smallest way was the urgent necessity to provide sensitive and prompt control of the engines in a seaway or accident, such as casting a propeller blade, or even propeller, which would probably mean the wrecking of the engines themselves, leading quite possibly to the entire loss of the vessel. In the specific case of large liners fitted with oil engines a certain amount of steam would always be required, necessitating the presence of either tank or tubulous boiler, fired, if so desired, from the waste products or by the oil fuel carried. Providing electro motor-driven winches and steering gear were adopted, steam would have to be utilized for such important purposes as hot and cold sanitary water services, heating emigrant quarters, extensive gallery purposes, and as per Board of Trade requirements for distilling apparatus.

The application of electric power to propeller shafts also claimed the attention of Mr. Willett Bruce, and in the course of his remarks he said the fact remained that electricity could not be directly liberated from fuel, similar to the case of heat, and for its production was dependent upon the energies of the heat engine; it must, therefore, only occupy a secondary place in this particular form of application. The demonstrations of practical experiment had been made in the case of a steamer on the Clyde, and the results as a matter of convenience and rapid manœuvring were satisfactory, but the actual economy was veiled in uncertainty, and, coupled with this, the fact of additional cost, also weight, were disadvantages from a commercial point of view, which would necessitate strong justification before practical adoption could be entertained. The electrical drive applied to the engine-room auxiliaries was quite practical, and as motors were now constructed there was not much to fear from failure. However, the fact should not be overlooked that with such a drive, or even a partial drive in cases of both turbines and reciprocating engines, the loss in the utilization of the auxiliaries exhaust steam for feed heating-purposes would fully absorb any gain in efficiency claimed for the electrical transmission. On the other hand the conversion of heat energy into electrical power on shipboard had been of immense advantage, giving opportunities to the builder of perfecting schemes, which, otherwise, but for such energy, would have been impossible, and nowhere was there a greater field of usefulness, as importantly contributing towards the brilliant and successful creation of both luxury and comfort in ocean travel.

General interest, particularly during the last two years, had been more or less concentrated upon aeronautical navigation, made more and more possible by the introduction of a reliable prime mover, having the utmost power per lb. of weight which has been realized by the introduction of the international combustion engine or turbine. The improvements developed by this branch of engineering were closely allied in their similitude to both marine engineering and naval architecture, having in their respective branches a natural affinity in details of motive power and form of screw propulsion and further than that in construction requiring structural design such as to ensure least resistance strength and durability, buoyancy and stability, and lastly, but most importantly steering control.

A vote of thanks was accorded to the President at the conclusion of his address.

PRESENT-DAY MARINE ENGINEERING PRACTICE AND ITS DEVELOPMENTS.*

(Continued from page 117.)

IN steam turbine design it had always been recognised that a very high vacuum was necessary for maximum economy, but it had not been generally considered that a high vacuum was conducive to economy in a reciprocating engine. The general impression had been that a vacuum greater than 25 or 26 inches of mercury was wasteful of heat, the loss due to the lower temperature of the feed water more than compensating for any gain due to the reduction in back pressure. There was at all times a considerable difference between the back pressure in the l.p. cylinder during exhaust and the pressure in the condenser. This difference could be reduced by increased size of ports and careful design of the various passages leading to the condenser.

Referring to combined reciprocating and turbine sets, which were designed to secure at once the efficiency of the reciprocating engine at the high-pressure end, and that of the turbine at the low-pressure end, the combination had probably failed to take full advantage of the theoretical saving possible with the system, because of the limitations imposed by the propeller, and the loss inevitably arising from the use of an additional screw and line of shafting. A recent design by the Hon. Sir Charles A. Parsons for an installation of this type shows the turbine geared to its shaft, which would allow of greater latitude in turbine design, and naturally lead to greater economy.

The subject of combination sets was a very fascinating one, and in considering it one was drawn to the conclusion that, in vessels of moderate size and speed, some arrangement of transmission gear which would allow of the turbine being coupled to the reciprocating engine shafting when going ahead, and being disconnected when going astern, would be a promising solution of the problem. Unfortunately, although such an arrangement had received the attention of several engineers, no satisfactory gear had so far as he was aware, yet been produced.

Dealing with the development of the internal combustion engine for marine propulsion, Mr. Hall-Brown said that it was significant that while the engines fitted to the gunboat *Rattler*, and to several commercial craft in Great Britain and on the Continent, were gas engines, the movement to-day was entirely in the direction of using oil as fuel. The fact that a gas producer was required to prepare suitable fuel gas for an internal-combustion engine of that type complicated the problem as far as the gas engines were concerned. In the case of the oil engine the fuel is put on board the vessel ready for the use of the engine, and the designer is free to concentrate his attention upon the problems presented by the prime mover alone. It is probable that the weight of fuel to be carried would be less with the oil engine than with the gas engine.

The development of the gas engine for marine purposes had apparently for the time being received a severe check, due to the attention paid to the oil-burning type; the gas producer is an additional element in the problem in this case. A gas producer for marine work would require to be capable of producing clean gas from the most bituminous coal. He was not aware that such a gas producer was at present on the market, but there was every reason to believe that the demand for a satisfactory producer of this class would be met in the near future. If this were so it was possible that the internal-combustion engine using gas as fuel might prove a formidable rival to the marine oil engine.

* Presidential address delivered before the Institution of Engineers and Shipbuilders in Scotland on the 24th October, by Mr. J. Hall-Brown. We regret that it is impossible to deal fully with Mr. Hall-Brown's address in the space at command, but we shall be pleased to put any reader who may desire to know more about the address in touch with the Secretary of the Institution.

[illegible] the quality of reli[illegible] [illegible] nt.

[illegible] He anticipated nothing but good as a result of the [illegible]

The Austrian Battleship [illegible]

THE AUSTRIAN BATTLESHIP "ZRINYI."

THE *Zrinyi* and her sisters the *Erzherzog Franz Ferdinand* and *Radetzky*, represent Austria's last word in battleship construction of the pre-"Dreadnought" era, and are of considerable interest as embodying a powerful armament, high speed and effective protection upon a limited displacement. The Mediterranean Powers are peculiarly favoured in being able to design battleships and cruisers without having to make extensive sacrifices in order to obtain those ocean-going qualities which are so necessary to our own ships. The North Sea and Atlantic are more exacting than the calmer Mediterranean and Adriatic, and consequently both Italy and Austria can, on a given displacement, produce ships having greater offensive powers and higher speed than the other Powers. Thus it becomes possible for Austria to build the "Zrinyi" class of 14,268 tons displacement, arm them with four 12 in., eight 9·4 in., and twenty 3·9 in. guns, and give them a speed of 20·5 knots, while the "Lord Nelson" class of 16,500 tons carry four 12 in., ten 9·2 in., and fifteen 3 in., and steam at 18·5 knots—a loss of a knot in speed and a gain of two 9·2 in. guns for an excess of 2,000 tons displacement. The advantage is with the British ship in armour and coal supply, however.

The gradual rise of Austria to a first-class Sea Power is worth more than the passing comment here given. Although her fleet has not yet assumed the proportions of that of her German ally, its commencement and growth have followed the same general lines. Her tactical units have been three ships instead of five as in the German Fleet, and the beginning of the new navy may be reckoned from the laying down of the "Habsburg" class in 1899—the previous 5,[illegible] "Wiens" being merely small coast-defence ships of little sea-going value.

On a displacement of 8,340 tons the *Ha*[illegible] and *Babemburg* carried an armament of three 9·4 in., twelve [illegible] in. and twenty-six [illegible] belts amidships, 8½ in. armour on their big and 5 in. [illegible] the smaller guns, and on trial steamed at 19·6 kn[illegible] with *circa* 16,000 h.p. They carried two big guns forward and one aft, and the 6 in. guns were in double decked casements with the small q.f. along the topside above these, making them "three-deckers." They

are still fast and very handy ships, and at present are undergoing a reconstruction which includes re-armament and removal of most of the superstructure. The average cost per ship was £650,000.

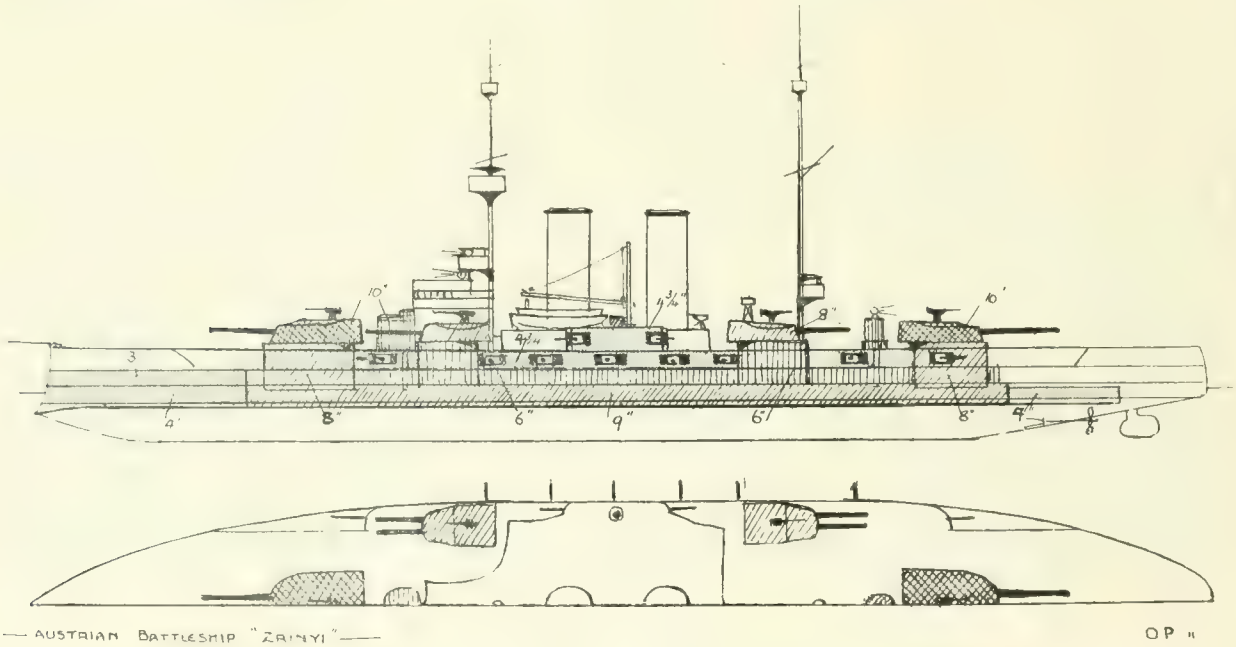
The "Erzherzog Karl" class which followed them were designed on the same lines, but are much larger and more powerful. The displacement rose to 10,000 tons, and the armament was increased to four 9·4 in. guns in two 9½ in. turrets fore and aft, and twelve 7·6 in. guns, four in 6 in. turrets on the upper and eight in 6 in. casements on the main deck. Fourteen 12 pounders in the superstructure constituted the tertiary battery. With a designed h.p. of 18,000, the ships touched 20·3 to 20·7 f.d. knots on trial, with 19 knots n.d. and 14,000 h.p.

Their protection along the water-line was increased to 8½ in.-6 in. Following these came the trio under notice, and in them the "coast-defence" idea has been abandoned and a "sea-going" type evolved. Twelve-inch guns replace the small calibre primary armament, and a pair of these is mounted fore and aft in big 10 in. turrets, having substantial bases of the same thickness. On the small level are four smaller 8 in. turrets with 6 in. bases, each containing two 9·4 in. guns, which have a command of 24½ feet. These guns are of 45 cals, and discharge a 474 lb. projectile, but are of the 1907 model. Between these smaller turrets is a 4 in. box battery containing a couple of 3·4 in., and eight more are distributed along the main deck on either side with similar protection, making twenty in all. There is a submerged torpedo tube on each broadside below water, and one under the stern.

The protection is represented by a total weight of 3,070 tons of armour. The main belt extends from some 15 feet fore and aft of the main turrets, and is 285 feet long by 7½ feet deep, 5 ft. of it being below water. Beyond to the bow and to within a short distance of the stem is a 4 in. continuation. The lower-deckside is protected by a 6 in. strake with a 3 in. bow continuation. Above this is the 4¾ in. battery amidships. The main bulkheads are 6 in. thick and the protective deck 2 in.

With machinery consisting of two sets of vertical triple-expansion engines designed for 20,000 h.p., and actuating two-screws, the *Zrinyi* has a legend speed of 20 knots. On trial, over 20,600 h.p. was reached (*Erz. Ferdinand Max*) and 20·76 knots recorded as the highest speed. A normal coal supply of 760 tons can be augmented to 1,350 tons maximum, sufficing for a range of 5,600 miles at 10 knots.

The dimensions are:—Length 448 ft. (water-line), 456 ft. (over all), beam 82 ft., and draught (mean) 26½ ft., giving a displacement of 14,268 tons. Herr Siegfried Popper was responsible for the design, and Herrn Gustav Lendecke and Anton Demal for the machinery plans. All the three ships were built and engined by the Stabilimento Tecnico, Trieste, and completed between 1910 and 1911.



Plan of the *Zrinyi*.

From the illustration and plan the general appearence of the ships can be gathered, and it will be noticed how small the actual target is as compared with the "Lord Nelson" type. This is, of course, owing to the fact that the Austrian tertiary battery is along the main deck, whereas in the British ship it is disposed along a flying deck high above the 9·2 in. upper-deck guns. Both systems have their advantages, for while the *Zrinyi* could fight her guns in most weathers prevailing in the Mediterranean, the *Lord Nelson's* guns, if on the same level, would be unworkable during a good portion of the year in British waters.

In many minor respects the *Zrinyi* differs from preceding types. For one thing, she is fitted with torpedo nets, and has the big boat derricks, which are characteristic of the latest German ships. The range-control tops, high up on the fore, and well down below the smoke course on the main mast are after the British pattern.

The "Dreadnoughts" which replace these three ships

MEMORIAL AT BIRTHPLACE OF HENRY BELL.

A MEMORIAL tablet marking the birthplace of Henry Bell, pioneer of steamship navigation in Europe, was unveiled on Nov. 4th at Torphichen Old Mill, West Lothian, situated on the banks of the river Avon. Under very unpropitious weather conditions the ceremony was performed by Mr. T. Hudson Beare, B.Sc., M.Inst.C.E., Regius Professor of Engineering, Edinburgh University. Provost Jamieson, Linlithgow, presided; and among those present were Col. H. M. Cadell of Grange, Col. John Cadell, Avonbrook, Mr. James Russell, Town Clerk, Linlithgow, Mr. J. Wilson Dougal, B.Sc., Edinburgh, honorary secretary of the movement, also descendants of Henry Bell in the persons of Mr. John Bishop, Auchineden, Blanefield; and Mr. Gilmour, Kilchattan Bay. Provost Jamieson said they were greatly indebted to Mr. John Wilson Dougal, who had been the originator of this movement and by whose efforts a sum of between £60 and £70 had been raised for the memorial.

Professor Beare then formally unveiled the memorial tablet amid loud cheers. In sketching the life and work of Henry Bell, Professor Beare said it was [illegible] intended that Henry Bell should be a stone mason, but at the age of sixteen he began his apprenticeship as a millwright [illegible]. Eventually he went to London, where he served for a time under the famous engineer Rennie. At a later period, while working with Messrs. Shaw & Hart, shipwrights, Borness, in the year 1786, his attention was directed towards the idea of steam propulsion for vessels, an idea then filling the minds of many inventors and engineers. In 1790 Henry Bell settled in Glasgow and in 1792 [illegible] with Mr. Patterson. About the year 1795 Bell began to turn his attention towards the problem of [illegible] propulsion, and in 1800 commenced to experiment. During the course of that year [illegible] successfully to the British Admiralty for support and [illegible] [illegible] that [illegible] impossible to be [illegible]. Though Bell [illegible] not to [illegible] the [illegible] of steam navigation [illegible] it was [illegible] [illegible] to whom this honour [illegible] the [illegible] of steamship navigation on a practical scale in Europe and in America he was preceded by Fulton.

Henry Bell received [illegible] towards during his lifetime for his great work. The Clyde Trustees gave him a pension of £50, subsequently increased to £100. Canning gave him a grant of [illegible] and a public subscription was raised for him in Glasgow and its vicinity. Henry Bell was interested in other mechanical pursuits and was evidently a man of extraordinary mechanical ingenuity. He died in 1830. There were two [illegible] in the Western Scotland but up till now there was nothing of the kind in the county of his birth, and the memorial which has just been unveiled would stand for as long as indicate the spot where Henry Bell was born.

The tablet, [illegible] granite, on which the old gable had been removed, [illegible] "Henry Bell, pioneer of steamship navigation in Europe. Born in the Old Mill House near this spot, 1767 A.D. Died at Helensburgh, 1830 A.D." The [illegible] representation of the [illegible]. The illustration of the gable and tablet we are enabled to give to-day is from a photograph taken by Mr. J. G. Dowie, Bathgate. Beside the tablet is the figure of an old man, Mr. James Baird, farmer, Bridgehouse by Bathgate, who is a grand-nephew of Henry Bell.

The Memorial recently unveiled at the birthplace of Henry Bell

The words on the tablet are as follows:—Henry Bell, Pioneer of Steamship Navigation in Europe. Born in the Old Mill House, near this spot, 1767 A.D. Died at Helensburgh, 1830 A.D.

The man in the picture—Mr. Baird—a farmer in the neighbourhood, is a grand-nephew of Henry Bell, and thinks his family are the nearest living relatives of Henry Bell

MARINE REFRIGERATION.

It would be difficult to find in the history of any branch of marine enterprise a development at once so sudden or extensive as that which has, within the last decade, been witnessed in the River Plate frozen meat trade. Ten years ago the Nelson interest practically dominated the business, and to the Nelson Line belonged the finest vessels in the service, the remainder of the meat being carried by smaller vessels, more as a side line than as a staple. But to-day five of more important syndicates are engaged in competition for the carriage of frozen cargoes, and the keynote is a general demand for increased size, more efficient and up to date stowage methods, and greater speed; coupled with increased insistence on the part of the meat shipper, on precautions against damage to his valuable shipments.

There can be no doubt that the wise policy followed by the Argentine "hacendista" of improving his stock by buying in all the best blood of this country, has now borne fruit in the increasing demand for his produce here; and the improved method of chilling instead of freezing the meat has made it possible to put on the British market an article which competes easily in point of quality and appearance with the best home-reared product. With these facts all before us, however, it is still permissible to question the wisdom of sinking the enormous sums presently being devoted to the building of the special type of vessel necessitated by the exigencies of the River Plate navigation and trade.

The great profits realized by the pioneers of the industry have induced others, lacking their experience, to rush in, in the hope of sharing the spoil, and it may reasonably be asked whether the prospects of expansion of the trade justify the equipping of numbers of large, fast ships, which, like the North Atlantic passenger vessels, are of little use in any other service. If the rate of construction averaged during the last few years be maintained, the trade is likely to be swamped by large vessels unable to obtain full cargoes. Such a swamping can only serve the interests of the meat shipper, and may pull down freights to such a point as to wipe out profits and make the lot of the unhappy shareholder even less enviable than it is. The cost of building and running a meat carrier cannot be judged by ordinary standards, even if a passenger vessel standard be adopted for comparison.

The insulation costs on an average 15 per cent. of the total value of the vessel which, together with another 12 per cent. for the machine, increases the capital value by 27 per cent., and this excess capital is unproductive unless the vessel be used as a meat carrier. In addition to this the expense of maintenance is abnormally high, if risk is to be avoided, and the growing demand on the part of shippers and underwriters for absolute safety throws more and more expense on the head of the owner. Insulation is tender, renewal is costly, and refrigerating machinery must be kept up to concert pitch or trouble is not far off, when, in the event of accident, the eagle eye of the expert finds the weak places. Even if time permits, the loading of heavy merchandise in insulated spaces is inadvisable as it inevitably damages the insulation, and this fact is so far realized that many of the largest vessels make the outward run light and depend entirely on the homeward freight for a return on the capital invested in them.

These considerations all tend to show how fatal any swamping which seriously affects freights must be to the success of a line of meat carriers capable of carrying 3,500 to 4,000 tons of chilled produce and steaming 13 to 14 knots, which is the present standard for new vessels, or the even more ambitious projects hinted at in the press. The squeezing out of smaller and less up-to-date vessels is the usual corollary to any development, but where, as in this case, the vessels so squeezed out are likely to be useless in any other trade, the very certain result is a cut-throat competition, in which the smaller vessels, having had their day and paid for themselves, are out to gain more than they lose, whilst the newer ships must be nipped.

In this connection we must remember the men who are financing and promoting these enterprises. Men of the type of Lord Furness, or Sir Owen Philips, do not make mistakes, and any enterprise bearing their names is *prima facie* likely to be successful; the danger lies, however, in the presence of smaller men whose flotations are almost certain to prove disastrous. It behoves intending investors to investigate very carefully propositions of this kind before risking their money. The writer had an opportunity some weeks ago of inspecting the plant and arrangements of the latest addition to the Lamport and Holt fleet, the *Vandyck*, which is incidentally the said firm's first attempt at a frozen meat carrier. The refrigeration arrangements are of the latest type and embody most of the improvements which experience has suggested, but some of the details seem worthy of more extended notice. The position of the plant (which is by Messrs. Hall & Co., of Dartford) between the tunnels is open to criticism, although the arrangement has certainly permitted a very orderly and compact plant. Tunnels are usually hot, and it certainly is not wise to add to the work the machine has to do by placing it in the hottest part of the vessel, but in this case very ample ventilation is provided and the arrangement may work well. The well supported compressor ends now almost universal are a great improvement on the unmechanical overhung type which, until recently, was invariably fitted. In the evaporator and brine tank rooms, again, the usual practice has been departed from, although in this case the writer does not think the best arrangement has been adopted. In this case it is necessary, if one wishes to enter the tank room to pass through the evaporator-room. In a chilled meat ship the regulation of the temperature necessitates constant visits to the tank-room, and as each visit means the entrance of large quantities of hot moist air from the tunnel (notwithstanding the air lock provided), it is difficult to see how the cold uninsulated shells of the evaporator and coil terminals can avoid being snowed up. The interesting experiment of leaving the evaporator naked in an insulated room is thus hardly given a chance of success. In the arrangement of a chilled meat vessel too great care cannot be taken to simplify the means of regulation, and it is advisable to arrange the outlet and return valves to each section as near each other as possible, preferably in the same alley way within easy reach of either hand. Refrigerating engineers are only human, and if the means of regulation are so widely separated as to necessitate constant running about, neglect is almost certain. A batch of 250 leads and returns requires more than ordinary attention. Space forbids entering into details of the ingenious brine mixing and injecting arrangements, which follow Hall's latest practice. The insulation throughout the vessel is of silicate and has been well carried out.

The writer understands that the installation has been completely supervised by the owners' superintendent engineer, who had, during the early stages, the advice and assistance of a well-known firm of refrigerating consultants. The vessel is to be followed by two sisters and no doubt the minor flaws incidental to a first vessel will be rectified.

The high price of charcoal now ruling, and the many objections to silicate for insulating purposes, has turned attention once more to the merits of cork for this purpose. There can be no doubt that the granulated variety makes a light, durable and effective insulator, and moreover, it is the only insulating material which can be dried after saturation and still retain its qualities unimpaired. Of the brick variety one cannot say so much. Those corners which, even with soft materials are hard to pack, are quite inaccessible. to the brick, and unless carefully supervised any awkward space is likely to be neglected with disastrous results.

When will refrigerating engineers realize that huge boxes of leads and returns four or five tiers deep and fifteen to twenty tiers wide are a source of danger and expense. The inner pipes are quite inaccessible, and as it is these which usually give out first, a simple burst may lead to large and needless expense, owing to the number of pipes which require to be removed to get at the source of the trouble. Considering the frequency of such bursts a little forethought here will save much money.

The new Federal boat *Shropshire* for the Colonial trade has completed her trials and left. The first of the Furness-Withy fleet, *El Paraguayo* has recently taken the water at Hartlepool. These vessels, which are the last word in frozen meat carriers, are expected on service in the early part of next year.

A small, but, as marking a new venture, important vessel has recently come into service. She is the *Imataka*, owned by Messrs. Booker Bros. & McConnell, and is intended for the development of the Venezulean trade. She is a CO_2 job and has two holds fitted for frozen produce.

Recent legal proceedings have pressed home the importance

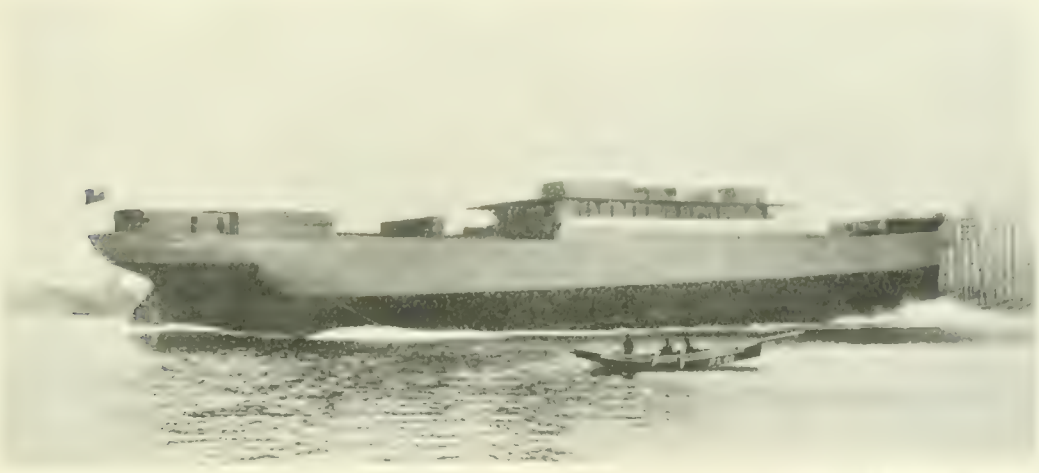
of the very thorough survey of the plant of refrigerated vessels and the necessity for competent independent survey. The day has gone when any kind of machinery was deemed quite fit to be exposed and put machinery in the purpose, and it is to be hoped that the best of the [illegible] too numerous [illegible] recently [illegible] the point [illegible] to wonder [illegible] the fact that competent and expert advice is necessary [illegible] that the delicate machinery cannot safely be left to my Lord Dick-o-Hatty who representing a surveying body is supposed to deal effectively with every thing of a mechanical nature from a stop valve to a winch. The writer hopes to deal with the matter more fully at a later date.

"EL PARAGUAYO."

The Largest Meat Carrier.

THE first of the twin-screw insulated steamers built to the order of Messrs. Birt, Potter and Hughes, Ltd., was launched on the 23rd of October from the Middleton Yard of Messrs. Irvine's Shipbuilding and Dry Docks Co., Ltd.

The construction of this vessel marks another long step forward in the frozen and chilled meat carrying industry, and she is intended to take her place in the new fortnightly express service of steamers between the River Plate and Liverpool, which is shortly to be inaugurated jointly by Messrs. Birt, Potter & Hughes, Ltd., and Messrs. Furness, Withy & Co., Ltd.



The launch of the *El Paraguayo*, the largest frozen and chilled meat carrier.

This vessel is the largest meat carrier yet constructed, having an insulated capacity of over 405,000 cubic feet, and the whole of this space is fitted both for the carriage of chilled or frozen meat. She has been constructed to the plans and specifications of Messrs. Wm. Esplen Son & Swainston, Ltd., and has been designed in excess of the rules and regulations governing the highest class in Lloyd's Registry, and to secure the Board of Trade certificate for the carriage of passengers, and to satisfy all the requirements of the Spanish laws in relation to the carriage of emigrants.

The dimensions of the vessel are 456 ft. 6 in. in length by 59 ft. beam by 38 ft. 1 in. depth moulded. She is fitted with four complete decks all fore and aft, with a bridge over the shelter deck 130 ft. long, a boat deck above this being 53 ft. 6 in. above the keel, and all of these six decks are steel-plated, the lower three being connected with "Latosilg," and the upper decks sheathed with pitch pine. A forecastle about 40 feet long is fitted on the shelter deck, in which are contained sleeping compartments, mess room, bath rooms, etc., for the seamen.

The frames throughout are of bulb-angle section, and the beams of channel section, the various decks being supported by three rows of stanchions all fore and aft, there being [illegible] stanchions in all. A cellular double bottom is fitted all fore and aft, divided into fourteen compartments, ten of which are available for fresh water, in addition to which large fore and after peaks are available for water ballast.

The vessel has nine steel transverse bulkheads, seven extend to the shelter deck, which with the various decks divide the vessel into twenty-six compartments, twenty of these being insulated throughout.

For the handling of the cargo five large hatches are fitted, trunked to the various 'tween decks and holds, and for discharging the cargo eleven powerful steam winches are fitted, together with twenty-seven large derricks, fitted with runners and blocks for discharging from the whole of the holds and 'tween decks at the same time, the owners and meat importers having specially co-operated to produce the most efficient type of vessel for the meat carrying industry.

For steering the vessel a powerful combined steam and hand gear is fitted in a house on the shelter deck aft, with telemotor attachment to the navigating bridge amidships. A powerful steam windlass is fitted on the forecastle head for manipulating the stockless anchors, and two large capstans are fitted aft for warping and mooring purposes.

Electric light is fitted throughout the vessel, with large cargo clusters at each hatch, and the hole of the signal lanterns, masthead lights, etc., are connected up with this installation. A room is provided for a Marconi machine, also for an operator, and the vessel will be equipped with wireless telegraphy. Six large lifeboats and two jolly boats are provided, and life-saving appliances in [illegible] of Trade requirements.

Accommodation for a limited number of first-class

passengers is provided in a deck-house on the fore end of the bridge deck, with a handsome roomy saloon in light oak with mahogany dado. This compartment is furnished with a piano, harmonising with the general scheme of decoration. The first-class smoke-room is situated in a house on top of the saloon, and is framed in fumed oak, having a number of writing tables, arm chairs, bookcase, etc. The baths, lavatories, etc., are all of the most up-to-date type.

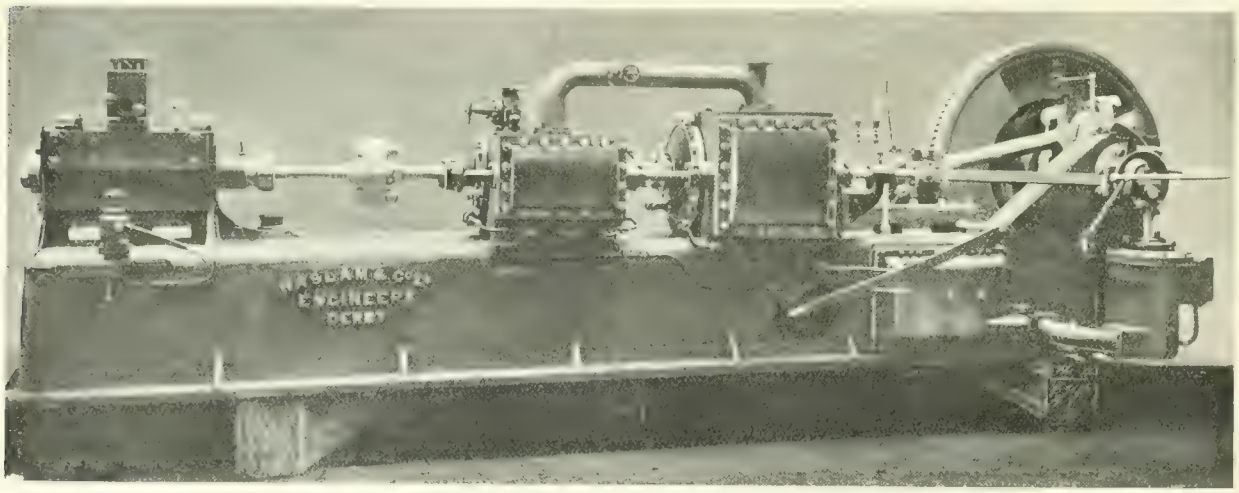
Accommodation for about 400 emigrants is fitted under the bridge deck, with all the necessary hospitals, wash houses, lavatory accommodation, etc., complete, additional accommodation being fitted for family parties aft in the shelter deck. Spacious accommodation is provided on the bridge deck for officers, engineers, doctor, purser, chief stewards, etc. The pantry and galley are equipped with the most up-to-date plant for assuring ready service, both being adjacent to the main saloon. Steam heaters are fitted throughout the accommodation.

An installation of refrigerating machinery is being fitted by The Haslam Foundry and Engineering Co., Ltd., of Derby, consisting of two horizontal combined surface-condensing duplex refrigerating machines of the most improved carbonic anhydride type, with brine circulation, the machines being so arranged that each may be worked entirely independently of the other, all parts being interchangeable in case of a breakdown. Two large carbonic anhydride condensers with copper coils are fitted, together with four brass-lined brine-circulating pumps and a large duplex water-circulating pump for circulating through the condensers. The insulated chambers throughout are cooled by brine circulation with flows and returns in sections, and the various insulated compartments can be regulated to a temperature suitable for frozen or chilled meat, the entire control of the brine system being centred in the refrigerating engine room. This installation includes the supplying and fitting of 45,000 meat hooks.

The inside of the shell, the underside of the decks, the bulkheads and the tank tops in all cargo spaces below the shelter deck are insulated with silicate cotton by The Liverpool Refrigeration Co., Ltd. and the orlop, main and upper decks throughout are sheathed with "Litosilo," securely anchored to the decks, and a caulked ribband of redwood, 3 ft. 6 in. wide, is laid on all decks. For ascertaining the temperature of the insulated spaces, 108 thermometer tubes are fitted to the various compartments. For consumable stores a provision chamber and vegetable room are fitted in No. 4 shelter 'tween deck, including ice-making tanks.

The machinery, which has been constructed by Messrs. Richardsons, Westgarth & Co., Ltd., Hartlepool, consists of twin-screw triple-expansion engines, with cylinders 25", 4½" and 70" × 48" stroke, with six large boilers working under forced draught at a pressure of 200 lbs. per square inch. The engines have been designed for a high rate of piston speed, and embody the latest improvements in marine engine practice, including the complete contraflo system of condensing and feed heating. This comprises both main and auxiliary condensers of the "Contraflo" type, independent feed pumps, exhaust steam direct contact-feed heater, cascade filters and a thermal receiver, in which all the auxiliary exhausts are collected before passing into the contact heater, any surplus steam being automatically discharged into the auxiliary condenser. The circulating water for the main condensers is supplied by two centrifugal pumps driven by high-speed engines of the enclosed type, and a cross-over connection is provided so that either pump will serve either condenser. On the main engines the accessories include Geddes' pulsator water traps for automatically draining the intermediate and low-pressure cylinder casings, Aspinall's governors, and in connection with the Edwards' air pumps a Weighton air gauge is fitted, by means of which the engineer is able to determine the amount of air leakage in the condensing system. The auxiliaries include large ballast donkey, harbour feed pump and general service pump, fresh-water and sanitary pumps, Morison's vertical radial evaporator and atmospheric ash hoists. The propellers are of the built type, with manganese bronze blades.

In connection with the forced draught installation there are two fans for supplying air to the furnaces, each fan being separately driven by a high-speed engine of the enclosed type.



Refrigerating Engine supplied to the *El Paraguayo* by The Haslam Foundry & Engineering Co., Ltd. The plant will be in duplicate.

THE N.P. PUMP BUCKET.

THOSE of our readers who are familiar with the troubles in connection with the water end of a boiler-feed pump, when the temperature of the feed water is high, will be interested in a new form of pump bucket which is being put on the market by the N.P. Pump Bucket Co., of 11, Queen Victoria Street, London, E.C.

The following description, with the aid of the adjoining illustrations, enables our readers to readily understand the working of this new design of bucket.

The principle on which this bucket works is similar to the old hydraulic U ring, except that in this case the pressure acts upon the flexible rings and expands them to the cylinder walls and at the same time forces the lips against the sides of the bucket grooves, practically eliminating slip. This expansion is automatically adjusted by the pressure against which the

pump works, with the result that the same pump can be used for high or low duty, enabling a considerable saving in steam, due to absence of any extra friction and leakage to be made. The flexibility of the rings in this bucket is of great advantage when used in barrels which have worn, like most liners, larger in the centre than at ends as the necessity of reboring is mainly obviated. We understand that in a fifty-seven hours' test with one of these buckets against one fitted with new ebonite rings it was found that the pump fitted with an N.P. bucket made only 82·7 per cent. of the number of strokes made by a similar pump fitted with ebonite rings and yet gave same delivery, representing an improved pump efficiency of nearly 20 per cent., and resulting in less wear and

tear of liner and valves. We understand that these buckets are being used in large numbers both on land and sea with excellent results, some feeding boilers with water at 275 deg. F. at pressures of 180 to 200 lbs. per square inch. We have had the opportunity of seeing a letter from the Chief Engineer of a steamer trading to the East, in which he states that the rings are giving the utmost satisfaction, the pump working dead slow on full delivery with no other sound than the beat of the check valve, and further that he found springs as usually fitted to small pump valves useless for working under these improved conditions. It is claimed that this proves conclusively that the bucket delivers more water and requires a stronger spring to meet it.

STEAM TURBINE THEORY.

AT the Institute of Marine Engineers on October 23rd, a paper on "Steam Turbine Theory" was read by Mr. F. J. Kean, B.Sc., Member. The Hon. Sir Charles A. Parsons, K.C.B. (Past President), occupied the Chair. In the course of the paper, the author said that the most convenient way to measure the energy liberated in a turbine in thermal heat units was to use the temperature entropy diagram. In the ideal case of the Rankine-Clausius cycle the expansion was perfectly adiabatic; no heat was being taken in or given out, the entropy remained the same. In an actual steam engine there was loss by condensation and radiation from the cylinder walls, while in the case of a steam turbine of the Parsons type, the energy wasted in steam friction returned to the steam and more than counterbalanced the radiation losses. The speed of the steam in that turbine was never less than 100 ft. per second and often reached 500 ft. per second, so that even with well-formed blading the surface friction must be considerable. The secret of power in expansive working was to cause the steam to give up its heat; the wetter the steam at exhaust the more efficient the turbine, provided the dryness fraction at exhaust was not less than the adiabatic value.

He had attacked the question of turbine efficiency by collecting and tabulating the properties of steam at a number of different pressures, starting on the 150 lbs. absolute as the initial condition. He then found the work done and the dryness fraction as the expansion continued adiabatically, until a pressure of 1 lb. absolute was reached. This represented the case of an ideally perfect turbine. He then outlined a method of calculating friction losses, and drew up tables showing at all points the entropy and dryness fraction of the steam under varying conditions of expansion. Summarizing the figures, it was found that when the steam expanded adiabatically from 150 lbs. absolute down to 1 lb. absolute, the heat available for work per pound was 315·0 B.Th.U.; when there was a loss of 10 per cent. in each expansion, the heat available for work was 320·9 B.Th.U.; with 20 per cent. loss it was 326·6 B.Th.U., with 30 per cent. loss it was 332·1 B.Th.U., and with 40 per cent. loss it was [illegible] B.Th.U.

In opening the discussion which followed, Mr. J. Veitch Wilson said he understood it sometimes occurred that the turbine blades became coated with foreign material and the velocity of the steam was thus impeded, also that the orifices were perceptibly reduced from the same cause. He referred to the difficulty of lubrication by reason of water becoming mixed with the oil.

Mr. G. W. Newall commented upon a comparison made by the author in regard to the steam friction in a turbine and an ordinary steam engine, and Mr. P. Smith, R.N.R., also spoke.

Sir Charles Parsons in continuing the discussion said that water turbine work was not connected [illegible] experienced in stopping the leakage [illegible] the blades, which in some cases amounted to

between 30 and 40 per cent. In re-action turbines, of the marine type especially, the initial pressure was less efficient than the low pressure. In the low pressure blades on the *Mauretania* the leakage was practically nothing, and their efficiency was about 85 per cent. In turbines of the impulse type, such as the Curtis, there was greater efficiency in the initial stages, but the frictional loss was higher. A compromise had been arranged by which the Curtis turbines were made with the Parsons blading for the low pressure and the Parsons turbine with the Curtis blading for the high pressure, about 70 per cent. of the whole power being of the re-action type. He considered that re-action blading would finally supersede all others. In actual practice error in blade area made very little difference in the turbine efficiency; a difference of 50 per cent. in the area of the blading would not, perhaps, make more than 2 or 3 per cent. difference in the efficiency. The blades and orifices got silted up sometimes, especially in small turbines, through the use of fatty compositions. The coating could be cleaned off with paraffin. It was best to use pure mineral oil for lubrication. Mr. Kean replied briefly to the various points raised.

MARINE MOTOR NOTES.

THE interesting paper read at the Institute of Marine Engineers on the shipping of the Great Lakes of America brings vividly before us the large amount of trade carried on in these waters, and gives an indication of what the *Toiler* may be the pioneer of in Canadian waters. It is noted that she has carried her first cargo, a full load of wheat and an oil supply to serve for a season. Somewhat of a controversy has been raised, and discussions have been waged on questions affecting the type of oil-engine best adapted for marine service. Advocates of the two-cycle, advocate it as more flexible and simple than the four-cycle, than which also it is capable of developing a larger H.P. per cylinder, due to the number of its power strokes. The twin-screw engines of the *Toiler* are of the two-cycle type, and the engineer-in-charge was from the works of the engine-builders at Stockholm. It has been stated that the marine engineer looks with an unfriendly and unfavourable eye upon the advent of the internal combustion engine, but from the recently published discussions on the subject, conducted under the auspices of the Institute of Marine Engineers, this view cannot be fairly advanced. The attitude of the marine engineer is not inimical, on the other hand, he has from the initiation of the internal combustion engine taken a deep interest in it, and in many cases has taken responsible charge of it in land installations, as he has of electric light and refrigeration stations, thus showing his power of adaptability, and, along with it an instinct born of his training, to reduce expenses and economise efficiently. The caution which is engendered by the responsibilities of sea-life impels him to study critically any new production, and possibly caution in some cases has been mistaken for prejudice; yet there is nothing in the discussions to which we have listened which has savoured on the whole, of anything but courteous criticism. It has been previously indicated in these notes that those makers who minimize the duties of the man in charge of internal combustion engines, make a mistake in so doing to their own hurt in dealing with marine work. A man in charge of a land engine, which is said to be fool-proof, can fall back upon the works on short notice in the event of anything going wrong or even threatening, but the man on the ocean wave has not the workshop at his elbow, and has to rely upon his own experience and reasoning judgment. Knowing somewhat of the difficulties and troubles which have been experienced with the internal combustion marine engines and connections fitted to date, caution is justified. Messrs. Pollock & Co. have had another Bolinders-engined vessel built at South Shields under trial during November. The vessel, 92 ft. 6 in. long is named the *Ogarita*, and is for coastal service. The engine is about 120 H.P., the speed attained on the trial was 10·75 miles per hour. The fuel used was shale oil with a sp. gr. of ·863. The French auxiliary-powered sailing vessel, *La France*, is now being fitted out, having been launched recently at Bordeaux. The success of the *Quivelly* may be presumed to have acted favourably towards the building of this type as forecasted some time ago, in connection with auxiliary power for sailing vessels and their possible future.

The representative gathering, held at Yarmouth on Nov. 18th, of those interested in the fishing industry, passed a resolution with a view to obtain Government loans to enable fishermen to purchase motors for their craft, either steam or oil engines, owing to the disadvantages of the purely sailing boats compared with the motor-driven vessels. The object is a good one and as a great public service is rendered by the fishermen they well deserve every encouragement in the pursuit of their arduous calling. The launches which are noted for November show the progress being made in the adoption of oil engines for ocean-going vessels, and another order is reported as given by a German-American Company for a large cargo carrier to Messrs. Cramp to be fitted with a Diesel type oil engine. It is probable that a tugboat for service in the Thames fitted with Diesel engines will be placed shortly, and on its success will depend following orders, as the advantages are obvious where coal is dear and smoke an offence. It may be noted, by the way, that help has been given to the Irish fishermen and oil engines ordered; this is a substantial argument in favour of the East Coast fishermen being similarly treated. Several further orders for oil engines for the South Coast carriers are on the eve of being placed to add to those formerly referred to. The necessity of having all the details of an oil-engined vessel carefully thought out and planned, in view of the exigencies of sea traffic has been emphasized on several occasions, and one detail productive of trouble by want of forethought of marine conditions is the oil tank, whereby water has entered with the oil, due to the heavy seas encountered, damaging the storage tanks and leakage occurring. The probable requirements of the Admiralty, previously forecasted, are likely soon to bear fruit in several orders for oil engines to be fitted in tenders and communication vessels between warships, the dockyards and naval stations. Messrs. Pearson, the eminent contractors, are about to extend their oil-motored vessels in Mexican waters, where they already have several running, preferably, on paraffin, the Beardmore and Gardner engines being two of the types. The Mexican Railway locomotives use oil fuel almost entirely.

Messrs. Beardmore are actively employed constructing "Beardmore" oil engines for many interesting small craft. In the middle of October orders were placed for a 38-h.p. set for Southampton; a similar engine for the Irish Congested Districts Board, and a 45-h.p. crude oil engine for the Crown Agents for the Colonies. At present there are being constructed at Dalmuir a 45-h.p. crude oil engine for a new steel fishing ketch building at Amsterdam, a 38-h.p. paraffin engine for an Australian trading schooner and a 60-h.p. crude oil engine for the Congested Districts Board of Ireland. Messrs. Beardmore have also fitted the 120-h.p. engines in the 80-ft. motor boat for the Marquis of Graham, just launched by Messrs. Ritchie, Graham & Milne, Whiteinch.

INTERNAL COMBUSTION MARINE MOTORS.—In the January issue we shall commence a series of articles on the Internal Combustion Marine Motor, which, no doubt, will be found interesting by our many readers.

CARDIFF.—A painful occurrence took place on Nov. 23rd on board the sailing ship *Indian Empire*. The donkey boiler burst, killing three men and injuring two others.

SHIPBUILDING AND MARINE ENGINEERING.—Look out for our special January number; order your copy early.

TWO-CYCLE OIL ENGINES.

At the Institute of Marine Engineers on November 6th, a paper on "Notes on Two-Cycle Oil Engines," by Mr. F. Duncanson, B.Sc., was read, in the unavoidable absence of the author, by the Hon. Secretary, Mr. Jas. Adamson.

In the course of his paper the author said the difficulties to be overcome in the design of a successful two-cycle oil engine were, first of all, that due to imperfect scavenging, the fresh charge was diluted with inert exhaust gases and hence combustion was imperfect. Due to the same cause, weak mixtures would not ignite at all. If the exhaust valve or port was still open when the fresh charge was pumped in, some of the fuel would inevitably escape with the exhaust and thus the fuel consumption would be high. The mechanical efficiency also of the two-cycle engine would be less than that of the four-cycle on account of the auxiliary machinery which must be used in scavenging the cylinder and pumping in the fresh charge.

On the other hand, the main advantages of the two-cycle engine were: (1) the absence of valve pockets and big valves in the cylinder head, combined the design very simple, giving the combustion chamber of clearance just wide enough, more compact, thus giving ideal conditions for ignition of the charge. (2) If the scavenging was perfect the total volume of the cylinder, i.e., the piston displacement, together with the clearance volume, was filled with fresh air, which could be usefully employed as the power stroke. (3) Much weaker mixtures could be used as well as, compared two-cycle engines, thus securing the maximum efficiency. (4) A more uniform torque could be obtained, which contributed to better propeller efficiency. (5) The exhaust noise at the engine would be much less than those of the four-cycle engine.

To utilize to the fullest extent the advantages of the two-stroke cycle engine, only independent pumps which could be designed as such without restriction should be used. Assuming that the cylinder volume was to be cleared out with air, the introduction of some air in excess was indispensable, hence there must be available a volume of scavenging air greater than the cylinder volume. Because during the scavenging period some air was certain to be lost through the exhaust ports, and unless some excess air was at hand some of the exhaust gases were certain to remain. If independent pumps were used, the supply of air might be made as much as was desired, but when the front end of the cylinder or crank case was used to compress the air, an excess was not obtainable. By careful design and understanding of the conditions to be aimed at, there was no reason why the all round efficiency of the two-cycle engine should not be as good as, or even better, than that of the four-cycle engine.

Mr. F. M. Timpson, in opening the discussion which ensued, said there seemed to be a gradual tendency towards the further adoption of the two-cycle engine. The system of injecting the fuel at the highest point of compression did away with the pre-ignition trouble. He did not think an independent pump absolutely necessary, especially for the smaller engines. For small powers he had found the two-cycle engine to be more economical than the four-cycle.

Mr. L. Stockleton said the author last night laid emphasis on the necessity of efficient scavenging, which was a very essential thing in two-cycle work. The two-cycle engine working on town or producer gas was not so successful, because the products of combustion gave more trouble. Uniform torque was an advantage which applied more particularly to high powered engines, and in these engines an independent pump was essential.

Mr. W. McLaren was of opinion that the two-cycle engine was more flexible than the four-cycle. The question of torque, he said, depended upon the number of cranks.

Mr. L. Jones said it was impossible to design an efficient two-cycle engine without dealing with the question of the burnt exhaust gases, and to this there should be separate scavenging arrangements. It was very difficult to arrange the valves, particularly in the combustion chamber of the four-cycle engine, and the separate combustion chamber, the latter was the provision for firing the charge.

The Chairman, in replying, said the internal combustion engine generally, and marine engineers were not always appreciating themselves with the advantages of the new type of engine. Marine work, however, was very different from land work, and the difficulties to be overcome were very great, not merely as regard the type of engine, but in connection with the extremes of the cooling and storage of oil fuel.

(Photo: Frank Sears & Son.)

A bird's-eye view of the deck of H.M.S. *Warrior*. The *Warrior* is the largest warship to pass through the Tyne bridges, and special preparations were made for her passage through the swing bridge with only a few feet to spare. She has now arrived at Devonport to be docked preparatory to commencing her trials. This vessel is a sister ship to the *Drake*. See "Naval Matters."

KINGSTON, JAMAICA.—The Water Street Steamship Company taken on the passenger from the Harrison Steamship Line *Point Lagos*, sailed on the Bahama line yesterday on account of her position at 30 guineas.

REVIEWS.

Repertoire General—General List of Merchant Shipping of All Nations. [illegible] Bureau Veritas Inter[illegible] Register for Classification of Vessels [illegible] well-known work which has been issued yearly since [illegible] as the Society which has a register for the classification [illegible] an existence since 1828, is now as ever [illegible] by the two handsome and thoroughly substantial volumes before us (one devoted to steamers and the other to sailing vessels), more perhaps than ever a work of reference which no shipping, shipbuilding or engineering firm in active business can do without. Naturally the volume concerned with steamers is the larger of the two, but for convenience [illegible] number of sections into which the work is divided are duplicated in the sailing volume; thus making it more bulky than the essential subject absolutely necessitates. Taking the review the steamer volume as representative of [illegible] it is seen that the major portion of the work (over [illegible] pages to be precise) consists of tabular matter giving all essential facts regarding dimensions, tonnage, rig, nationality, date and place of build, style of construction, mode of propulsion, dimensions and power of engines, pressure of steam, name and residence of owners, also port of registry, and name of master of every steamer afloat measuring over [illegible] tons. Preceding this main portion of the book is a section giving a "key" to the abbreviations employed in the tables; and a table of French measurements and their English equivalents and *vice versa*. In front of this, again, are sections giving general statistics of the tonnage afloat according to nationality, also statistics of steamers of 100 tons gross and upwards which have been built, purchased and sold during 1910 in various countries. Following the general list, are a number of sections which serve to analyse and classify the information in ways which are found extremely useful. These comprise an alphabetical list of steamers arranged according to tonnage, occupying over forty pages; a list of steamers carrying petroleum in bulk, arranged according to their nationality; also a list of cable laying steamers. Following these is an alphabetical list of steamship owners, arranged according to nationality, together with the names and gross tonnage of their steamers; an alphabetical list of iron and steel shipbuilders, arranged according to nationality, and many pages of information regarding the dry docks, patent slips, floating dry docks, etc., in all parts of the world. For ease of reference, accuracy and clearness of type the 1911-12 volumes of the "Repertoire Général" are even more admirable than their predecessors. The work, it ought perhaps to be explained, is distinct from the Bureau Veritas Register Book, which has been issued annually in January since 1858. The register book is used chiefly by charterers and underwriters, whilst the work above noticed is more for the general reference of all interested in shipping in any way. Seeing that the publication is now in its 42nd year its utility is without doubt well established.

Marine Steam Turbines. By Dr. G. Bauer and O. Lasche. (Translated from the German by M. G. S. Swallow.) London: Messrs. Crosby Lockwood & Son. Price 10/6 nett.

THE work on the Design and Construction of Marine Engines and Boilers by Dr. Bauer has been so well received in this country in its translated form that it is not surprising that the companion subject of steam turbines should receive attention. The original author is in this instance associated, as joint author, with a director of the Allegemeine Electricitats Gesellschaft Turbine Works, in which the Curtis turbine has been largely developed, and it is, therefore, not surprising that the present volume presents most interesting matter to those who take a practical interest in the subject. The volume opens with a concise treatise of the comparative merits of turbine and reciprocating engines for marine purposes, which are useful not only to the engineer, but to those who have direct interest in the earning capacity of motive power. The subject as a whole is divided into three sections, which comprise, in addition to the introduction referred to, general remarks on the design of a turbine installation; calculations of turbines; design; shafting and propellers; condensing plant; arrangement of turbines under various heads; general remarks on the arrangement of turbines in steamers; turbine driven auxiliaries, and lastly a set of tables which the reader will find useful in applying the formulæ to actual practice. The work may be taken as the experienced opinions of two professional men, whose aim in life is the production of a commercial result from the work that they direct, while the work of translating the record of such experience has been carried out in a way which the intelligence of the reader will readily appreciate.

Verbal Notes and Sketches for Marine Engineers. By J. W. Sothern. Glasgow: Messrs. James Munro & Co. 7th Edition. Price 10/6 nett.

THIS extensively revised edition is a bulky volume of over 600 pages, divided into ten sections, dealing with the "verbals" matter of the Board of Trade examinations and is profusely illustrated by sketches, plates and diagrams. The first portion of the book is devoted to summarizing present-day manufacture of the marine steam engine with descriptions of shop methods of erecting and lining-up. The next section treats very completely of the design, construction and operation of the Scotch type of boiler, rules and worked examples for riveted joints, stays, tubes and furnaces, with notes on corrosion and repairs, and a short reference to water tube boilers. This is followed by sketches of various engine and piping details. The fourth section deals with valves and gears, describing and illustrating all the principal types of marine slide and piston valves, link motion and radial gears; several typical tables of valve settings are given and explained with reference to the valve diagram for full-out and linked-up positions. The fifth section consists of general notes on main and auxiliary details, with definitions of physical and mechanical terms, followed by a section on chemistry as applied to marine work for fuel, water and oil. The seventh section treats of electric lighting, the *rationale* of the dynamo, with tests for faults, hints on running and repairs. The next section treats of propeller design and drawing, with various pitch-finding devices supplemented by several dimensioned drawings of typical propellers. The various systems of refrigeration are then dealt with in general and in detail, with instructions for running, locating and remedying defects. The last portion of the book is devoted to oil and coal-gas engines, descriptive of the cycles of operation and types of engines, with miscellaneous notes. Steam, area and hyp. log. tables are added. The book as a whole is well arranged and adapted to the needs of candidates, and the bulk of the information is given in its best form, that of illustration.

Valves and Valve-Gearing. By Chas. Hurst. London: Messrs. Charles Griffin & Co., Ltd. 6th Edition. Price 9/ nett.

THIS book, dealing practically with all forms of valve-gearing, is in its sixth edition, which speaks well for the reception it has had from the public. It is to be noted that several illustrations in various parts of the book have been replaced by later designs. We note some additions to valve diagrams, where the position of the valves relatively to one another are shown in various places around the centre diagram, the positions of the valves to one another being shown relative to various crank positions, this probably making the whole diagram more readily comprehensible to those students who may not have given much previous study to the subject. It is to be noted in cases where valves are shown that the end next to the diagram circle represents the front end of the valve, that is the end nearest the crank shaft. The movement of the valves are shown by arrows, which indicate the movement at the particular position shown. If no arrows are shown the valve is in the extreme position of its movement, and has, therefore, no motion at that particular instant. Part V., devoted to safety and relief valves, is new in this edition, and, in addition to ordinary illustrations of well-known safety valves, the drawings of the various forms of the valve seats are well worth attention. This is supplemented with many illustrations of relief valves, showing a spring-loaded valve and deadweight valves. It closes with a well-designed illustration of a high steam and low-water valve, well explained as to action.

Elementary Manual on Heat Engines, Steam, Gas or Oil. By Prof. Jamieson. London: Messrs. Chas. Griffin and Co., Ltd. 13th Edition. Price 3/6 nett.

THIS volume is the thirteenth edition of this excellent elementary text-book, forming, as it does, an introduction to the author's more advanced text-book on "Steam, Steam

[illegible]

and other [illegible]

and country [illegible]

[illegible] before the [illegible] strokes, with the following power stroke and exhaust [illegible] now brought u[illegible] they may obtain an excellent elementary introduction to [illegible]

The Testing of Motive Power Engines. [illegible]

Messrs. Lo[illegible]

[illegible]

of locomot[illegible]

then [illegible]

trial, and details of the measurement of draught an[illegible]

[illegible]

Whittaker's Electrical Engineers' Pocket Book. [illegible]

[illegible] all the [illegible]

[illegible]

The "Mechanical World Pocket Diary and Year Book, for 1912." [illegible]

[illegible] the [illegible] introd[illegible]

[illegible] spiral gears; speed calculations, etc.; new tables of weights [illegible] been added. Finally the notes on shafting [illegible]

Superheated Steam Diagrams. [illegible]

[illegible] ach.

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Forscherarbeiten auf dem Gebiete des Eisenbetons. [illegible]

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Motoren und Winden für die See- und Kustenfischerei nach dem Preisausschreiben des Deutschen Seefischerei-Vereins. By D[illegible]

[illegible]

FOREIGN NOTES.

Russia.

A RUSSIAN engineer has devised a new type of submarine cruiser which is to have a displacement of [illegible] tons with a height of only 7·5 metres. Its radius of action at a reduced speed of 11 knots on the Pacific Ocean would be 18,000 sea miles. Its maximum speed is to be 26 knots per hour afloat and 14 knots under water. The operation of submersion is effected in three minutes.

Italy.

The battleships *Leonardo da Vinci* and *Giulio Cesare* have both been recently launched from the Odero and Ansaldo yards respectively. The vessels are to be finished as quickly as possible, and after satisfactory trial runs they will be got ready for immediate service. Both vessels are alike in displacement, armament, etc., with one difference: the *Leonardo da Vinci* having Blechynden-Odero water-tube boilers and the other Babcock Wilcox boilers. The dimensions are: Length, 570 ft. overall, beam 91 ft., draught (mean) 27 ft., displacement 22,000 tons, i.h.p. 26,000, speed 22 knots. Both vessels are sister ships to the *Conte di Cavour*, described in our October number.

Peru.

The armoured cruiser *Dupuy de Lome* has been purchased from France for the price of £150,000. She is to be completely overhauled in four and a half months and well equipped at a cost of £30,000, and then delivered to the representative of the South American Republic.

Holland.

The new armoured battleship which is to be built in the Government Dockyard is to be fitted up with two reciprocating engines of 10,000 h.p. to give the ship a speed of 18 knots. The vessel will cost £[illegible]. The armament is to consist of four 28 cm. guns, ten 10·5 cm. quick-firing guns and three 53 cm. torpedo tubes. It is intended to place an order, probably with Dutch yards, for several torpedo boats of 180 tons and a speed of 30 knots.

France.

The screw steamer *Irma*, built to the order of a French firm and of Messrs. Howe & Co., of Cardiff, has just been launched. The *Irma* is to be used for a special service between Swansea and Montain on Gironde, and is to begin her services at the commencement of 1912.

The shipyard Chantiers de France have just received an order for a cargo steamer for a shipping firm at Bordeaux of 6,000 tons deadweight, a sister ship to the *Phoebe*, which is at present on the stocks at the same shipyard. We understand that a third steamer is to be ordered at the same shipyard as soon as the terms have been arranged.

The Transatlantique Shipping Company has just placed an order for a new steam packet for the Oran line. It is to receive the name *Duc d' Aumale*, and to be ready for sea in sixteen months. Its dimensions are—length 115 m., beam 15 m., depth 9 m., and the speed is to be 17.5 knots.

The launch at Bordeaux of *La France* from the slips of the Gironde Works on the 9th of November, is a notable event, as this five-masted sailing vessel is to be fitted with oil engines which are to provide auxiliary power to give a speed of fully 10 knots. Her main particulars are as follows:—Length overall, 430 ft.; beam, 57 ft. 5 in.; draught fully loaded, 23 ft. 8 in.; displacement, 10,730 tons; tonnage, gross, 6,100. The vessel has been built for the Auxiliary Ships Company, of Rouen, the managers being Messrs. Prentout, Lebond & Leroux, the well-known French shipowners. The four-masted barque *Quivelly* fitted with Diesel engines belongs to the same Company.

Argentine Republic.

The torpedo destroyer *Salta* of the Argentine Republic has been built at the shipyard of Dyle and Bacalan at Bordeaux, and has just been launched successfully. The *Salta* is the fourth of the destroyers ordered in France about a year ago. The sister ships are the *Mendona*, *Rioja* and the *San Jana*. Her displacement is 980 tons and the contract speed 32 knots. It is equipped with five White-Forster boilers, four to be used for coal and one for oil fuel. The motive power is supplied by two turbines on the Rateau system, developing together 18,000 h.p. The vessel is fitted with sixteen water tight compartments.

The train ferry steamer built and engined by Messrs. Inglis, Glasgow, for the Argentine N.E. Railway Company for the purpose of linking up their system with that of the Paraguay Railway is an indication of the enterprise of the Republic. Messrs. Inglis have also contributed to the trade and passenger carriers of the Argentine by other vessels they have built.

Germany.

Several trial runs have been carried out with the battleship *Helgoland* and a speed of 22 knots was attained, so that the *Helgoland* holds the speed record, as the *Thuringen* only made 21·1 knots and *Ostfriesland* 21·3 knots. The machinery of the *Helgoland* worked with great efficiency and no hitch occurred.

The German traffic in the Suez is constantly increasing. In the past year 635 ships of nearly three million tons used the Canal, against 602 ships of 2¾ million tons in the year 1909. The English tonnage in 1910 was 10·4 million tons with 2,778 ships, taking the first place, Germany coming second, other countries following with less tonnage and ships.

The importance of Hamburg as a seaport is strongly in evidence by the tonnage traffic at the present time, which is 12,657,000 tons as against 8,038,000 tons in the year 1900, the increase being about 4½ million tons. Hamburg is now the greatest seaport next to London, which ranks first with 18,631,000 tons, showing an increase of three million tons on the figures of 1900. Hamburg has overtaken Liverpool and Cardiff; Antwerp and Rotterdam, also show enormous increases and threaten to overtake these two of our large seaports very shortly.

The French Liner, *Rochambeau*, recently launched, designed and engined by the Chantiers et Ateliers de St. Nazaire-Penhouet. See April, 1911, issue.

The Howald Works for shipbuilding at Kiel have latterly had numerous orders for new construction. The Government has placed an order with these works for the small cruiser *Ersatz Geier*, to be equipped with triple-expansion engines and boilers working at high pressure. The works have further secured orders for four petroleum tank steamers of 7,000 tons each for a Hamburg firm. Orders have also been placed with them for various steamers, *viz.*, a large cargo steamer for a Hamburg firm, a passenger and cargo boat for the South America line, besides several other minor orders for coasters and harbour service. The Roland Line has placed an order for three cargo boats of 10,000 tons each, with the "Weser" yard at Bremen, the others with shipbuilders at Hamburg and Flensburg.

Denmark.

On November 4th, the new Diesel-motor vessel *Selandia* was launched from the yard of Burmeister & Wain, Copenhagen. She is the first of three vessels ordered by the East Asiatic Co., of Copenhagen. The *Selandia* has a displacement of 10,000 tons, is 370 ft. long, and 53 ft. broad. No funnels are fitted, the blow-out being effected through the hollow steel masts, of which there are three. The engine-room is commodious, being calculated to hold two large motors and two smaller auxiliary motors. The petroleum

tanks are placed in the double bottom along the entire length of the vessel, a pumping apparatus conveying the petroleum from each tank to the motors. All the winches are worked by electricity. The *Sylvania* will be fitted out as a first-class cargo boat, but will have accommodation for about thirty passengers.

Japan.

The proposal that the Nippon Yusen Kaisha should maintain a regular line of steamers between this country and China, the Straits Settlements, Burmah and India appears to be backed by Government support, and will probably take effect in the course of 1912.

Australasia.

The harbour authorities of several of the Australasian and New Zealand ports have been moving in the direction of deepening the channels by dredging operations, to bring these up to modern requirements, in some instances entailing powerful plant and careful supervision.

RETIRAL OF WELL-KNOWN LEITH SUPERINTENDENT ENGINEER.

Mr. Hugh Thomson.

THE retiral almost simultaneously from active service of two prominent officials—both named Thomson — connected for very long periods with the Port of Leith and its shipping is a double event of which some record in our columns is desirable. One is Mr. Hugh Thomson, superintendent engineer to Messrs. James Currie & Co. (Leith, Hull and Hamburg Steam Packet Co.), who for the long period of forty-five years has been connected with the firm, during the last seventeen of which he has filled the responsible position named. The other is Captain William Thomson, who retires from the post of dock and harbour master, after having been thirty-one years in the service of Leith Dock Commission. Both retirals were fittingly, and of course separately, marked at gatherings of business associates and friends, and by handsome presentations being made. At the gathering of the marine engineers in the service of Messrs. James Currie and Co., Mr. William Ford, engineer of the *Bernicia*, in the unavoidable absence of Mr. Robert Reid—who succeeds Mr. Hugh Thomson—presented the latter, in highly appropriate language, with his portrait, a gold albert and appendage, and a gold bangle for Mrs. Thomson; and read the remarks which Mr. Reid had intended to make on the occasion. In the course of these he said that Mr. Thomson, by his honourable dealings with everyone, and every subject in hand, and his transparent sincerity of devotion to his owners, had won the admiration and trust of all. He was open-minded to the consideration of all matters laid before him, and took great care at all times to make himself familiar with all the aspects and bearings of every subject. He had the knack of drawing all his engineers around him, as all superintendents ought to have, and with that cycle he kept in constant touch. Mr. Thomson, in a reminiscent speech, feelingly replied, and thanked the engineers of the Company for their great kindness.

OBITUARY.

Nicol S. Arthur.

WE have to record with regret the death of Mr. Nicol Sinclair Arthur, shipbuilder and engineer, which took place at 51 Rupert Street, Glasgow, on Nov. [illegible]. Formerly of the firm of Messrs. Croom & Arthur, shipbuilders and engineers, Leith, the deceased was better and more widely known as the inventor of shipbuilding machine tools, one of which—the automatic frame-bevelling machine—has been in use in the shipyards of this country for the past twenty-five years, and improved makes of which by Messrs. Davis & Primrose, Leith, capable of dealing with the heavy and varied sections now common, have been installed in the largest shipbuilding works in this country and abroad. More recently another invention of Mr. Arthur's—the roller-bending machine for cold bending of beams and other curved constructional items of ships—has been receiving extended adoption. He was also the inventor of an automatic boiler-stoking system and other minor [illegible] appliances. At various times he patented modifications in methods of ship construction; and one such patent taken out about twenty-three years ago in conjunction with Mr. Johanson, then chief draughtsman to Messrs. J. L. Thompson & Sons, of Sunderland, anticipated Mr. Arthur [illegible] the longitudinal system of framing now extensively practised under the patents secured some years ago by Mr. J. W. Isherwood. A description of the earlier invention is on record in the transactions for 1888 of the North-East Coast Institution of Engineers and Shipbuilders in the form of a paper read by Mr. Johanson and an exhaustive discussion thereon. Mr. Arthur received his early training as a shipbuilder with Messrs. Earle's Shipbuilding Co., Hull, and Messrs. Denny, of Dumbarton. While engaged there, his abilities came under the notice of Mr. Richard Ramage, who was at that time shipyard manager to Messrs. Denny, and some time after Mr. Ramage had left and established the firm of Messrs. Ramage & Ferguson at Leith, he invited Mr. Arthur to become foreman of the iron-working section of the new shipyard. After some years' service in this capacity, Mr. Arthur went to the Tyne district and shortly thereafter returned to Leith to form in conjunction with Mr. J. A. Croom, the firm of Messrs. Croom and Arthur, shipbuilders, engineers and ship repairers. Under this title for a good many years business was carried on in the building of [illegible] as well as in ship repair work of all kinds. For the past twelve or fifteen years Mr. Arthur carried on a consulting business in Glasgow, protecting various of his inventions and bringing others prominently before users.

Industrial and Trade Notes.

THE CLYDE AND SCOTLAND.

(Continued from page [illegible] *ent.*)

New Allan Liners.—It was stated about the last month or so that the Allan Line directors were considering the tenders for two new vessels and to-day twelve of the leading shipbuilders in the country and Clyde, awarded contracts, are about to be interested in the Clyde shipbuilding industry that such vessels have been placed with local firms. One of them is to be constructed by Messrs. Wm. Beardmore and Co., Ltd., Dalmuir, and the other by the Fairfield Shipbuilding and Engineering Co., Govan. The vessels are to be [illegible] ft. in length overall, [illegible] ft. in breadth, of about [illegible] tons gross, and of [illegible] knots service speed. They will have accommodation for [illegible] first class, [illegible] second class and [illegible] third class passengers. As compared with the latest Allan liners, [illegible] the vessels now ordered will show the following improvements. They will be [illegible] ft. longer, [illegible] tons larger and will carry [illegible] more passengers. The speed will be [illegible] knot more. Compared with the Empress steamers they will be [illegible] ft. longer, [illegible] tons larger and will carry 225 more passengers. They will be larger than even the White Star liners *Laurentic* and *Megantic*; so that they will be the largest (although by no means the fastest) vessels on the Liverpool-St. Lawrence route. The Frahm anti-rolling tank system will be adopted in the two steamers. The propulsive machinery will consist of four screw shafts arranged in three engine rooms, and driven by turbines of the Parsons type, consisting of one high-pressure ahead, one intermediate pressure ahead and two low pressure ahead turbines; and two turbines astern. The two astern turbines will be incorporated with the low-pressure ahead turbines and will be over the inner lines of shafting. The power will be divided as nearly as possible over the four shafts and each shaft will be fitted to work independent of the others by a suitable arrangement of pipes and valves. The total power is to be 19,000 shaft horse power. The boilers are to be worked under Howden's forced draught, and they will be arranged so that oil may be used, if it is found economical to do so. There will be six double-ended and four single-ended boilers, the former being 16 ft. 9 in. in diameter by 22 ft. long. For the carriage of provisions refrigerating machinery and cold storage with a capacity of 70,000 cubic feet are arranged for. The vessels are to be classed under the British Corporation for the Survey and Registry of shipping.

Naval Contracts.—Actual and Prospective.—While the placing on the Clyde of one of the two new super-Dreadnoughts which are to be given out to private contract has not yet been officially announced, it is very prevalently understood that the Clyde firm whose tender—along with that of Messrs. Vickers, Ltd., of Barrow-in-Furness—was the lowest, is almost certain to be given the contract. The firm in question is Messrs. Beardmore & Co., Dalmuir. This firm, who will shortly have on hand an exceptionally large volume of work, are understood to be among the successful tenderers for the three protected cruisers in the Navy Estimates for the current year, the other two successful firms being Messrs. Armstrong, Whitworth & Co., and Vickers, Ltd., Barrow. Each of these firms has completed a vessel of the type. The vessels now ordered will be larger and faster than the *Dartmouth*, will displace 5,440 tons, and have a shaft horse-power of 25,000 for 25 knots. The main armament will consist of ten 6-in. guns.

Messrs. Beardmore on October 18th launched the last ocean-going destroyer *Goshawk* for H.M. Navy. The vessel, which is of the new "Acorn" class, is finely designed for high speed and has a long high forecastle which affords ample accommodation for the crew and which will enable her to [illegible] in bad weather. The propelling machinery consists of Parsons turbines with Yarrow water-tube boilers, which have [illegible] at Dalmuir. It is interesting to note that the [illegible] the first destroyer built at Dalmuir. The [illegible] of the battleship *Conqueror*, now building at Messrs. Beardmore's yard, have had most successful pit trials and are now being installed on board the [illegible] Works, Scotstoun, and are the first hydraulic mountings to be manufactured by the Company. The design embodies many new features calculated to increase the rapidity and certainty of the gun fire. The Coventry Ordnance Works are also making at Scotstoun the 13.5-in. gun mountings for the battleship *Iron Duke* building at Scott's Works, Greenock.

Messrs. D. & W. Henderson & Co., Ltd., Partick, have booked an order from Messrs. [illegible] & Co., Liverpool, for a steamer of about [illegible] tons deadweight capacity.

Messrs. Alex. Stephen & Sons, Linthouse, have received an order from Messrs. [illegible] & Co., Ltd., for a steamer specially designed for the transportation of bananas. The vessel which is to be ready in June next will be [illegible] ft. long and [illegible] ft. beam with a register of [illegible] tons. She will have twin screws driven by a double set of quadruple expansion engines capable of giving her a sea speed of 14 knots. The vessels of this line do not carry general cargo, but the increased size of the new steamer will afford space for a central deck house providing accommodation for fifty first class passengers. Messrs. Stephen & Sons have also received an order from the Howard Smith Co., Ltd., Melbourne, Sydney and Brisbane, for the construction of a twin-screw passenger and cargo steamer about 410 ft. in length, 56 ft. in breadth, and [illegible] ft. [illegible] in in depth to shade deck. The vessel will have high class accommodation for [illegible] first, [illegible] second and [illegible] third-class passengers, and will be fitted with quadruple expansion engines to give a speed of about [illegible] knots.

Messrs. Lobnitz & Co., engineers and shipbuilders, Renfrew, have received an order from the Suez Canal Co. for a rock cutting vessel of the largest size. This is the third vessel fitted with apparatus of this type supplied by the firm to the Suez Canal Co. Recently the firm shipped in pieces a powerful stern-wheeled steamer of light draught to the Congo for service on that river. She is similar in design to several already sent out by the firm, all of them being adapted for using oil fuel in their furnaces instead of coal, experience having shown that oil can be obtained quite as conveniently as coal for Congo service, and is more suitable in other ways. Accompanying the sternwheel steamer was the material for two lighters, also for trading on the Congo. Messrs. Lobnitz and Co. have also recently delivered a suction dredger to the order of the Buenos Ayres Western Railway Co.

Messrs. John Brown & Co., Ltd., Clydebank, it is reported, are to be responsible for the design and building of two of the latest Russian "Dreadnoughts" which have just been laid down at Nicolaieff for the Black Sea fleet. Nine cruisers, six destroyers and six submarines are also to be built there; and Messrs. Vickers, of Barrow, who are to build a "Dreadnought" at Nicolaieff, will share this large naval contract with Messrs. Brown & Co. This is a notable instance of how great British shipbuilding firms are developing their operations abroad, and in that development the Clyde is taking a foremost part. Messrs. John Brown & Co. and the Fairfield Co., Govan, are associated with a new shipyard at Sydney, Cape Breton; while at Esquimault, on the Pacific Coast, Messrs. Denny Bros., of Dumbarton, are very largely concerned in a dry dock and shipping company which was recently formed there. These developments have been made necessary by the fact that all the new vessels for the Dominion Navy must be built in Canada.

Messrs. Dunlop, Bremner & Co., Port Glasgow, have received an order from the Park Line (Messrs. J. & J. Denholm), Greenock, to build and engine a vessel of 250 ft. in length and 2,500 tons, for the Continental and Baltic trade. The vessel will replace the *Mountpark*, which was sunk in collision in the North Sea in February last, and will be constructed to Lloyd's highest class. This is the first order received by the new firm of Messrs. Dunlop, Bremner and Co. since taking over the business of the deceased Mr. D. J. Dunlop.

Messrs. Murdoch & Murray, Port Glasgow, have received an order to construct two twin-screw steamers of medium dimensions for South American owners. The vessels, which are intended for passenger and cargo trade on the Brazilian coast, will be supplied with triple-expansion engines by a Glasgow and a Greenock firm respectively.

The Clyde Shipbuilding and Engineering Co., Port Glasgow, have received an order from the Pekin Syndicate for a steam collier of about 3,000 tons deadweight. The vessel is to be used for coasting purposes, and will be fitted with Temperly transporters. Her propelling machinery will include inde-

pendent air and circulating pumps, with contra-rotating [illegible] auxiliary condensers and feed-water generators, so as to be able to have the necessary auxiliaries ready to the last possible advantage.

Messrs. Scott's Shipbuilding and Engineering Co., Greenock, both of whose yards are very crowded with important warships, naval and mercantile, have just been [illegible] by Messrs. J. Leyland & Co., Liverpool.

Messrs. George Brown & Co., Garvel Shipbuilding Works, Greenock, have recently received orders for four steamers of medium dimensions intended for cargo and passenger service. Together with the orders in hand the new work will keep the yard well occupied right up to the spring of next year. One of the steamers is for a Liverpool shipping concern and the others are for owners with whom Messrs. Brown & Co. have previously contracted. All the vessels will be engined by a Glasgow firm, Messrs. Brown & Co. not being their usual engineers.

Outfitting Facilities at Port Glasgow.—Two Lanfranchi engines whose premises stand upon the boundary between Port Glasgow and Greenock, the new firm of Messrs. Dunlop Bremner & Co., Ltd., Inch Works, Greenock, and the well known firm of Messrs. Russell & Co., Kingston Yard, Port Glasgow, have jointly approached the Town Councils of Greenock and Port Glasgow for their consent to the closing up of a portion of Boundary Street, which extends from the main road between Greenock and Port Glasgow to the foreshore of the Clyde. Boundary Street constitutes the dividing line between Greenock and Port Glasgow, and also separates Inch Works from Messrs. Russell & Co.'s Kingston Yard, and is not otherwise made use of. It is proposed that a new dock will be made where the street is at present, with a wharf, the dock being dredged to a depth sufficient to float the largest class of vessels. Here a large [illegible] crane, [illegible] is erected, and the steamers fitted by the two firms supplied with their machinery at this point irrespective of where the machinery is constructed. While the position of the proposed new wharf is equally convenient to both slip yards, it is also closely adjacent to the engine and boiler works which form a portion of the establishment formerly owned by Messrs. D. J. Dunlop & Co., and which the new firm of Messrs. Dunlop, Bremner & Co. are enlarging and improving to deal with steamers up to 500 ft. in length. Messrs. Russell & Co., who have no engineering or boiler making department in their works, have over a dozen full sized building berths, their output, as is well-known, being usually at or near the top of the award returns. At present after steamers are launched from the yard of Messrs. Russell and Co., they have to be towed to Greenock or Glasgow to be engined, but by the new arrangement steamers will be berthed at the lock in the yard, and the engines conveyed thither by river or rail. Besides this new wharf, there would also be a repairing slip constructed. The applications are meanwhile before the Greenock and Port Glasgow Town Councils. Greenock Town Council have already had the matter under consideration, while Port Glasgow Town Council appointed the Provost and magistrates to confer with the authorities at Greenock.

The Caledon Shipbuilding and Engineering Co., Dundee, have received two important orders each for a vessel of [illegible] tons gross tonnage. One is from the Anglo-American Oil Co., London, for a vessel to carry oil in bulk, and the other is for a passenger and cargo vessel for British owners.

THE TEES AND HARTLEPOOLS.

Whitby.

The International Line S.S. Co. (Messrs. Marwood & Co.) are reported as having [illegible] the [illegible] steamer from Messrs. J. Macpherson, Newcastle-on-Tyne.

Middlesbrough.

Messrs. Sir Raylton Dixon & Co. are [illegible] in making [illegible] contract from the General Steam Navigation Co. to build a steamer of [illegible] tons [illegible] for it long as it does not [illegible] with three large boilers at their yard. [illegible]

Messrs. W. Harkess & Co., Ltd., [illegible] to be very busy, and will [illegible] the [illegible] yard.

Messrs. Smiths' Dry Dock Co. continue very busy. [illegible] steamer, which was recently launched [illegible] yard, having [illegible] continue to be very busy.

Messrs. Richardsons, Westgarth & Co. have a large amount of work on hand, and are reported to be [illegible] in the face of [illegible] labour. They are [illegible] to be very busy this year.

Stockton and Thornaby.

Messrs. R. Ropner & Sons are [illegible] the contract to build a [illegible] for large passenger and other steamers built here.

Messrs. Craig, Taylor & Co. are [illegible] a contract for two cargo steamers to carry about [illegible] tons deadweight for Mr. H. C. Hansen, Sandefjord. They also continue to be very busy.

Messrs. Richardson, Duck & Co. have a good amount of work on hand, and are reported as expecting to secure a large contract which is in the market.

Messrs. Blair & Co. are reported as having booked several orders for sets of machinery for vessels building locally for the West. They are very busy in all departments.

West Hartlepool.

Messrs. W. Gray & Co. continue very busy. Amongst the recent orders just booked are two tw[illegible] cargo steamers for Messrs. Strick & Co., Cardiff, which will make twenty-six steamers built by them for this Company alone. They are booked up with the exception of one small berth.

Messrs. Irvine's Shipbuilding and Dry Dock Co., Ltd., have plenty of work on hand. They have recently had the s.s. *Nagir* *Firmgard* in, getting a new deck and several new furnaces. Great activity is being fed by the presence of new tonnage turned out here.

The Central Marine Engine Works of Messrs. W. Gray and Co. have booked the orders for the machinery for the steamers to be built by them. They are very busy in all departments.

The Horsley S.S. Co. are reported as having sold the s.s. *Hoxton* of [illegible] gross tons to J. Mountain, Esq., Newcastle-on-Tyne.

Hartlepool.

Messrs. Irvine's Shipbuilding and Dry Dock Co., Ltd., continue to be very busy. Besides the Tyne Tow Co.'s steamer, and Messrs. Hepburn's steam trawler, they are reported as having secured a contract for two [illegible] cargo steamers, [illegible] for London and Liverpool [illegible] with the work in hand will keep them busy till about midsummer next year.

Messrs. Richardsons, Westgarth & Co., Ltd., continue very busy. They have recently [illegible] a contract to supply the machinery for a small steamer, building by Messrs. Rowlett, Dixon & Co., Middlesbrough, to Messrs. Furness, Withy and Co., Ltd., to be completed in [illegible] months. They are quick [illegible] at work, which shows the resources in the yard. They have also booked an order for a set of [illegible] machinery, [illegible] to be built by Messrs. [illegible] to the order of Messrs. Howard, Smith & Co., Melbourne.

THE HUMBER AND DISTRICT.

(From the last issue, page [illegible]—*cont.*)

Messrs. Earle's Shipbuilding and Engineering Co., Ltd.—[illegible] the contract from the Wilson Line for [illegible] the North [illegible] of [illegible] will work on [illegible] of [illegible] and will have [illegible] accommodation and a good [illegible]. The [illegible]

patent slip has been fairly well employed overhauling and painting steamers and opening out machinery for surveys.

Goole Shipbuilding and Repairing Co., Ltd., have been successful in securing the contract to build a salvage and tug steamer for the Wilson Line. She will be fitted up with the latest pumping machinery and appliances and certified to carry passengers.

Messrs. C. D. Holmes & Co., Ltd., engineers and boiler makers, are fairly well employed; they have just finished four of the largest trawlers, boilers and machinery, for local owners, and fitted them each with their patent compound winches of large dimensions. They have also docked the s.s. *Algeba*, which has undergone a heavy and expensive repair, bottom and stern damage; also docked the s.s. *Princess Thyra* shell repairs, and opened out for survey; s.s. *Alice* has undergone hull repairs, and machinery and boilers opened out for survey.

Messrs. Cooper & Co., Ltd., engineers and boilermakers, have had a splendid month of repair work. The s.s. *Teviot* has had extensive repairs to ballast tanks, etc.; s.s. *Pando* new floors and insulation, and other repairs; s.s. *Monkstone*, docked and extensive repairs; s.s. *Lossie*, docked and extensive damage repairs done. The firm's pattern, moulding, boiler and fitting shops have been working at full pressure. Their dry dock has been well employed with coasting steamers, etc., and the branch shop at Alexandra Dock has also had a fair amount of repair work.

Messrs. Woodall & Co., engineers and boilermakers, are full up with repair work on coasting steamers after the recent great gale on our coasts. They have also an order for a complete set of their patent "Handiblocs" for s.s. *Gourko*, now building at Messrs. Earle's Shipbuilding Co. for Wilson Line.

Messrs. Stewart & Craig, engineers and boilermakers, have been fully employed during the past month on the following steamers, engine-room and deck repairs:—s.s. *Roskra*, s.s. *Arthur*, s.s. *Patria*, s.s. *Ariel*, s.s. *Folda*, ship *Glenesk*.

Messrs. Amos & Smith, engineers and boilermakers.—The machinery of Messrs. Amos & Smith's works is running night and day to compete with the new orders for engines and boilers. The firm have had an exceptional month in dry dock and damage work. The outside staff have been exceedingly busy, fitting out new ships and repair work. The branch shop at Alexandra Dock has also been kept fully employed with repair and dry-dock work.

Thomas Tate, engineer and boilermaker, Clarence Street; has been a good month in repair work amongst the foreign and coasting steamers.

Messrs. The Hull Central Dry Dock and Engineering Works, Ltd., have had to engage the outside docks, as their own dock was fully engaged, to get through the work they had in hand. The following steamers have been docked and repairs executed to hull, rudders, etc., also engine-room and deck repairs:—s.s. *John Hardie*, *Paul Pair*, *Andros*, *Armourer*, *Graphic*, *Heatherside*, *Alguba*; other steamers, *Richard*, *Ariel*, *Leafield*, *Ethyl*, *Sjostad*, *Hillglade*, *Olympic*. Several of the above steamers have gone through survey by Lloyd's. Several inquiries from owners and agents of steamers coming to this port have been received.

Messrs. The North-East Coast Engineering Works, Ltd., have been busy on the following steamers:—s.s. *Fox*, *Labran*, *Goosebridge*, *Hetda*, *Eftikhia*, *Gogovale*, *Blackwood*, *Deddington*, tugs *Powerful* and *Chester*. The *Gogovale* has been opened out for Lloyd's No. 2 Survey, and damage repairs executed to hull and several plates. Other steamers have been in for repairs to hulls and machinery.

Messrs. Cochrane & Sons, shipbuilders, Selby, are still receiving orders for new trawlers and drifters, and have to work overtime to cope with the orders received from Hull and Grimsby owners and others outside the Humber ports. Several trawlers have been launched last month, and received boilers and machinery at Hull docks by local engine-builders. They are all built under Lloyd's Survey.

Fish Docks.—The fitting and boiler shops belonging to the different trawler owners are fully employed, preparing and opening out for survey, etc. Several of the older types of trawlers are changing hands to foreigners. The N.E.Ry. slips on the dock are well booked up with trawlers as they come in from sea. Several trawlers are undergoing overhauling, after coming through the late gales of November on the North Sea.

SOUTH OF ENGLAND AND ISLE OF WIGHT.

(From our Own Correspondent.)

The Union Castle Co.—Extensive alterations have been carried out to the Southampton offices of the above Company, and the offices now present a very handsome and extensive stone frontage. Rumour has been very busy here lately concerning the carriage of the mails by the company to South Africa. The Company's contract for the carriage of the mails has less than a year to run, and rumour had it that the Company was to be purchased by the South African Government, but this has been officially denied; also it was said that the Union Government intended to build their own vessels to carry the mails, and further rumour has it that a South African syndicate is buying up all the Company's shares so as to get a controlling interest. The true position will doubtless be made known in due season, meanwhile a definite pronouncement is eagerly awaited.

The Royal Mail Co.'s ocean-cruising yacht *Arcadian* will leave Messrs. Harland & Wolff's yard about the middle of this month, for Southampton, and will make a trip to the West Indies and New York, after which she will make several cruises to Bermuda. Later she is scheduled to make several trips from the British Isles to the Norwegian Fjords, and the Northern capitals of Europe. The dining saloon is two decks high and large enough to accommodate all the passengers at one time. A feature of the ship will be the promenade deck, which extends from end to end of the vessel, and will be about 500 ft. long.

Messrs. Day, Summers & Co., Ltd., Northam Ironworks.—The Admiralty paddle tug *Grappler* was at the Company's yard last month undergoing an extensive overhaul. Several yachts are fitting out, including Mr. Davison Dalziel's *Capercailzie* (772 tons) and the Duke of Sutherland's *Catania* (668 tons), the latter having just returned from a nine months' cruise, which included a trip up the Canadian Lakes.

Messrs. J. Samuel White & Co., Ltd., East Cowes, Isle of Wight.—Last month the first keel plate of the first of the Chilian destroyers was laid at the yard of the above Company. Work is proceeding on H.M.S. *Forester*, which completed a satisfactory preliminary speed trial during November.

The "Olympic" arrived at Southampton from Belfast on the 22nd of last month, after completion of the repairs due to the collision with H.M.S. *Hawke* in September last. Whilst these notes are being prepared a Court of Inquiry is sitting, and the result of their deliberations is eagerly awaited. It is rumoured that the White Star Co.'s claim amounts to over £200,000. It is proposed to mark the swinging ground for the *Olympic* and *Titanic* by three gas buoys, and the matter will come up for settlement at the next meeting of the Harbour Board.

Fire at Sea.—On the 12th of last month the Norwegian steamer *Horatio* put into Southampton Water with a fire in the after hold. The fire continued to make rapid headway, and eventually the crew took to the boats and rowed ashore. The Isle of Wight Steam Packet Co., who own the tugs, sent three boats down to the abandoned vessel and salvage operations commenced. The *Horatio's* cargo consisted of 3,000 tons of coal, 6,000 oil barrels and a quantity of explosives. Owing to the latter the operations were carried on at considerable risk, but after continued pumping the flames were got under control. The *Horatio* was engaged carrying supplies to the whaling fleet in Antarctic waters. The after part of the vessel has been completely gutted, and at one time the flames shot up almost to the mast head, and could be distinctly seen from the dock head here. It is expected that the vessel will be brought into the docks for repairs at an early date.

Messrs. J. I. Thornycroft & Co., Ltd., Woolston Works, Southampton.—British Admiralty Work.—H.M. torpedo-boat destroyer *Acheron* was delivered into H.M. service last month, also H.M.S. *Ariel*, a sister vessel, successfully completed her speed trials. Two twin-screw tugs for South America.—Both these vessels sailed for South America under their own steam about the middle of last month. The frames for the two steel 690-ton paddle tugs for the Admiralty are being set and riveted. The two 60-ft. steel barges ordered in October are completed and will be shipped early this month. The 80-ft. barge for the Crown Agents for the Colonies will be shipped early this month also. Repair

work. Good progress has been made with the work in hand and this department has been well occupied during the past month with troopship, yacht and cargo work, etc.

THAMES.

(From our Own Correspondent.)

Shipping Companies.—The P. & O. Company's new vessel the *Ballarat*, has sailed on her maiden voyage to Australia via the Cape. She is of 11,000 tons register and 520 ft. long by 62 ft. wide and 41 ft. deep. There are nine water tight compartments with an installation of wireless telegraphy. Besides 1,100 third-class passengers the vessel can carry 10,000 tons of cargo. For the 13,000 mile journey the boat is a new departure and affords the greatest possible comfort for the charge to the passenger. The Royal Mail Company have recently had launched for them at Messrs. Workman and Clark's the twin screw steamer the *Desnado* of 11,200 tons. There are two other boats of the same type being built for the Company. They are over 500 ft. long, and while intended largely for the meat carrying trade also provide superior passenger accommodation. Another vessel for this Company is the *Arcadian*, coming from Messrs. Harland and Wolff's and intended for ocean cruises. She is a twin screw boat devoted wholly to passenger service. No cargo hatches will interfere with the bold sweep of the promenade deck 500 ft. in length, so it will be seen what an innovation this means.

Mr. E. Pembroke.—The death of this gentleman removes a leading figure from the City shipping trade. He was the head of the well-known firm of Galbraith, Pembroke & Co. He was also chairman of the Shaw, Savill & Albion Company, a director of the British Steamship Investment Trust and chairman of the Austin Friars Steam Shipping Company. The deceased had also filled the post of president of the Chamber of Shipping and in a variety of ways represented shipping in the City on its best side.

Mariners' Club.—An institution primarily intended for naval and mercantile marine officers has been opened in the West End at Arlington Street with the above title and at the inaugural dinner eighty gentlemen sat down. A feature is the nautical character of the club, seen in its pictures and other appurtenances, prominent being Nelson's portrait.

MERSEY AND MANCHESTER SHIP CANAL.

(From our Own Correspondent.)

WHILE the British Admiralty have recently shown their appreciation of the excellent shipbuilding and engineering facilities existing in the Mersey port with a few exceptions this has hardly been true of the mercantile marine. Signs are not lacking that there is now a further improvement in this latter direction since the order for the first steamer for a new Atlantic Passenger Service is to be built locally.

Messrs. Cammell, Laird & Co.—Every department of this yard has been very busy, and everything points to the fact that this state of things will continue. Certainly the most interesting event during the month has been the securing by this firm of an order for an Atlantic liner. In the past the Norwegians have had to patronize Continental, Liverpool or Glasgow Lines to America. The Den Norske Amerika-linje Co. of Christiania, which the Norwegian Government have subsidised, have placed the order for the first steamer with Messrs. Cammell, Laird & Co. This vessel and her sister ships will be equipped with all modern appliances and will carry 130 first and 200 second class passengers and 1,100 emigrants, and will be of the following dimensions: Length 510 ft., beam 62 ft., depth 40 ft. 6 in. to shelter deck. They will have twin screws, with quadruple expansion engines with cylinders 27 in. by 37½ in. by 53 in. by 75 in. diameter, stroke 54 in., which it is expected will give a speed of 16½ knots. The service will be maintained between Christiania, Bergen and New York, and possibly other ports. The naval architects are Messrs. Gray & Bruce of London and Liverpool, and the Agents are Messrs. Vogt & Magnus, Liverpool. The Port of London tug *Westbourne* was launched on Nov. 4th, and has now all her machinery on board and is undergoing her trial trips. The steam launch *Seaforth Sixteen* for the Mersey Mersey Docks & Harbour Board has been completed, and will be dismantled for shipment to Central Bolivia. An [illegible] for a [illegible] also for shipment abroad, [illegible] barge. The [illegible] destroyers *Fortune* and *Firedrake* are receiving their machinery in the West Basin. H.M.S. *Thunder* tender to the depot ship for submarines, is now undergoing trials, while her sister-ship *Alecto* is also nearing completion. The other extensive Admiralty work is making rapid progress. The repair department have had several important contracts in hand. The Cunard Line *Caronia* left on Nov. 24th, after being in the wet dock several weeks for turbine repairs, this vessel being, by the way, the largest vessel yet to enter the wet dock. The *Barrowmore*, of the Johnston Line, has had stern repairs, the *City of Lahore* is having a keel fitted while the Woodside luggage boat *Francis* has had new main and A frames fitted. The Hest Lines *Pek Lee* has had grounding repairs effected, while the same Company's steamer the *Pekin* has also been in for damage repairs. The *Tyrwhitt*, recently purchased by the Isle of Man Co., has had her cabins rearranged and various alterations to suit the Company's service.

Messrs. Clover, Clayton & Co.—With the increased facilities recently completed at the graving docks owned by the Company, work is now turned out in the least possible time, an interesting contract recently completed being the *Glory*. This steamer drove ashore at Preston. After giving this firm brought the vessel safely to Birkenhead. About 60 ft. of the bottom under engines and boilers was set up. The *Elleric* and other steamers have been in for overhaul and repairs.

Messrs. H. & C. Grayson.—A distinct feature of this firm's business is the construction of tanks of various kinds, which are made in sections for foreign shipment. An interesting contract recently completed was the whaler *[illegible] Gomes*, which has now left after thorough outfit for South American waters, under Captain Anderson. Other steamers which have passed through this firm's hands are the *Alderney*, *Faraday*, *Sierra Morena* and *Admiral*.

Mersey Docks and Harbour Board.—At a meeting of this Board, held on Nov. 9th, Mr. Henry M. Liardet notified his intention to retire at the end of the year. Mr. Liardet has been Harbour Master for thirty-one years, and in the Board's service forty-seven years. He was born at Vizagapatam, Madras Presidency, his father, Colonel C. E. Liardet being in the Madras army. Mr. Liardet served in the Indian Marine from 1851 to 1863, when that service was abolished. Joining the Dock Board in 1864, vessels of 3,000 tons were looked upon as leviathans, whilst the docks extended from the Canada in the north to the Brunswick in the south, and were then a forest of masts instead of funnels. Mr. Liardet attained the rank of Lieut. in H.M.I.M., and was present at the Indian Mutiny. Mr. Chas. E. Paynter has been elected a Member of the Board in place of the late Mr. Wm. Adanson.

The Manchester Ship Canal.—Mr. H. A. Reed, M.I.C.E., has been elected Chief Engineer to the Manchester Ship Canal Company in place of the late Mr. Herbert Congreve. Mr. Reed was the contractor's engineer on the harbour and dockyard extension at Gibraltar for the Admiralty for a period of ten years. He was also one of the engineers engaged upon the construction of the Manchester Ship Canal.

Liverpool Engineering Society.—Mr. W. S. Willett Bruce, R.N.R., has been elected President of this Society for the ensuing year. Mr. Bruce was born in 1861. Readers are referred to *The Marine Engineer and Naval Architect* of November, 1907, for particulars of his career.

The Cunard Line.—The *Franconia* recently made her quickest run between Liverpool and Boston, [illegible] days [illegible] hours 34 mins. The dry docking for the next two months has again been placed with the Denaby & Cadeby Main Collieries, Ltd. This contract has been held by this Company for the past six or seven years. Good progress is being made with the [illegible] by Messrs. John Brown, which the *Lusitania* is expected to be on service on January 31st.

The Autogenous Welding and Cutting of Metals.—An interesting demonstration of the Carbic Oxy-Acetylene welding and cutting plant was recently given at the works of

Messrs. [illegible] Laird & Co. Representatives of various [illegible] dock board officials etc. being present. A [illegible] diameter was cut through in four minutes [illegible] the heads of three boiler rivets were sheared off in [illegible] minutes. The plant is mounted upon a light steel bogie [illegible] very portable. Carbide cakes are used which are prepared from calcium carbide and are a speciality of this Company. This carbide plant has only recently been [illegible] on the market but it has already been largely adopted. The offices of the Company are at 27 Cannon Street, London.

The White Star Line.—It is reported that Messrs. Ismay, Imrie & Co. have placed an order with Messrs. Harland and Wolff for a steamer of about 40 ft. long and about 94 ft. broad. This vessel will thus be 100 ft. longer than the *Olympic*.

NORTH-WEST OF ENGLAND.

(From our Own Correspondent.)

Barrow.—There is greater activity than ever in the shipbuilding and engineering trades of this district and there is employment at Barrow for a very much larger number of men than are at present engaged in the great shipbuilding concern here but it is found very difficult to get skilled men in consequence of the busy times in the trades in other places. Further there is again a scarcity of houses in Barrow. This difficulty has been experienced in this place on many previous occasions, and every time builders have responded to the demand, as they are doing at present. It is obvious in the near future there will be even greater activity in the trade than has ever been known as signs are not wanting that in all departments of Messrs. Vickers' gigantic trade here great developments are pending, which will not only embrace a large number of new orders, but probably new industrial branches of considerable importance.

New Business.—It is known that Messrs. Vickers, Ltd., have tendered for one of the new battleships to be built for the British Navy, and also for a scout cruiser of somewhat larger dimensions than the *Dartmouth*, just delivered to the Admiralty during the last month. In both instances it is reported that the Barrow tenders are the lowest, and it is confidently expected that both orders will come to Barrow. If they do the Barrow yard will indeed be thronged with work in a way it has never been before but even with this possible accession of business the capacity of the Barrow yard will not be over-taxed as the resources of the firm are exceedingly great and in every sense up-to-date, and they are being added to from time to time as better appliances are available and as better means of doing economic work are brought before the notice of the directors.

H.M.S. "Dartmouth."—This scout cruiser went through her acceptance trials during the month with very satisfactory results, and was taken over by the Admiralty, but some defects have since been discovered, and it will be necessary to put these to rights before the vessel can go into commission.

The Japanese Cruiser.—The construction of this vessel is proceeding very satisfactorily. It is urged that a greater push has been put into the work in consequence of the need there is for the ways on which she is being built for another big ship, the order for which has either been placed or is in a fair way for being so. At any rate when she is ready for launching, which will be a few months yet, a berth for her will be found in the Buccleuch Dock alongside the British cruiser *Princess Royal*, which is rapidly being completed, but she will be three months late as regards her building contract, owing to the troubles caused by the lock-out of boiler makers and other features of industrial unrest.

The Chinese Cruiser.—The Chinese cruiser *Ying Swei* is now complete and she is ready for her trials. Another Chinese cruiser has come to Barrow with a crew to take the new vessel out to the Far East on the completion of her trials. There is every prospect of additional work from the Chinese Government, and it is probable that in the long run Messrs. Vickers, Ltd., will be interested in a new shipbuilding yard in the China Sea to be built for the purpose of building ships for the Chinese Navy in her own country.

Foreign Developments.—Messrs. Vickers, Ltd., seem to be getting their hands full of foreign enterprise. It is known they are interested in Spain, Canada and Russia and, it is stated they are also negotiating with Portugal, Turkey and another Power for bringing into existence other three shipyards of a similar type to that which is being worked so satisfactorily in Spain and all of which are likely to find employment in a greater or lesser degree for the works of the parent firm at Sheffield and at Barrow.

H.M.S. "Lion."—Very great interest is taken in the trials of the British cruiser *Lion* which are to take place almost immediately. The engines of this monster vessel have been built in Barrow, along with engines for a similar vessel, the *Princess Royal*. These monster ships have a designed speed of 28 knots per hour which will need a great deal of getting. They have engine power representing 70,000 horses, and they are long ships with smart lines, but after all it regards a big thing to accomplish.

Submarines.—Messrs. Vickers, Ltd., having delivered most of the "D" class of submarines are now devoting themselves to the construction of the "E" class, which is a vast step forward in sub-aqueous craft. They are no longer driven by means of petrol which resulted in such disastrous accidents in some of the earlier ships but by crude oil engines which are working very satisfactorily. Further, the new vessels are to be armed with guns which can be readily used when the vessels are afloat.

Engineering.—The engineering department of Messrs. Vickers, Ltd., was never so taxed as at present. Orders are alike plentiful in the marine department and in the gun-mounting shops, but the facilities for production are improving day by day, and it is probable that ere long further additions to the works and the machinery will force itself on the attention of the management.

Shipping.—The shipping trade is very quiet, and is likely to remain so, as the trade in iron and steel is still depressed.

BELFAST.

(From our Own Correspondent.)

Messrs. Harland & Wolff.—The *Olympic-Hawke* case is at time of writing proceeding, and it bids fair to be a most interesting one. Meantime the repairs to the former vessel have been completed, and before these notes go to press she will be on her station once more. The *Arcadian* (ex *Ortona*) is at present in graving dock, and she will shortly be ready for sea again. Extensive alterations have been carried out, luxurious accommodation having been provided, such as will put her in the front rank of high-class cruising yachts. The *Deseado*, which was launched on October 26th, from the north end of the Queen's Island, is the first of three large twin-screw steamers that the builders have on order for the Royal Mail Steam Packet Company (see Launches and Trial Trip section). The close of another year is approaching, and when the tonnage output lists come to be published, the Queen's Island firm will probably once again be found at the head of the column. They have still several vessels of big dimensions to put into the water before their list for the twelve-months is complete. Messrs. Harland and Wolff are amongst the number of firms tendering for two sets of battleship engines, and it is to be hoped that they will secure the order for one or both sets. The engines which they have already built for the Admiralty have given the greatest satisfaction in every respect.

Messrs. Workman, Clark & Co. have at the fitting-out wharves the latest addition to the Shaw-Savill & Albion Company (particulars of which have already appeared in *The Marine Engineer*) and the *Ekma*, built for the British India Steam Navigation Company. The former vessel will shortly be ready for her trial trip. The *Ekma* is 424 feet long, and gross tonnage over 5,100 tons. She will be propelled by two sets of triple engines, steam being supplied by four large boilers working under forced draught. Messrs Workman, Clark & Co. have executed ship and engine repairs on the Anglo-American Oil Company's steamer *Lackawanna*, and at present they have the Tyser liner *Mimiro* in hand for overhaul and repairs. This vessel was built by them in 1900. During the past few weeks they have had successful trial trips of the new fruit steamers *Sixaola* and *Tivives*. These are sister-ships, being 394 feet long, and over 5,000 gross tonnage each.

LAUNCHES AND TRIAL TRIPS.

LAUNCHES English.

Steel Screw Coaster.—On October [illegible] there was launched from the yard of Messrs. Jas. L. Livingstone & Co., Ltd., South Shields, an up-to-date steel screw coaster intended for the coasting trade, and constructed to the order of the Overton Steamship Co., Ltd., Messrs. Castle & Greenhalgh, managers, of Liverpool. This vessel, as well as a sister ship now nearing completion, for the same owners, has been supervised during construction by Messrs. Roscoe & Little, consulting engineers, of Liverpool.

Jessmore.—On October [illegible] Messrs. Richardson, Duck, and Co. launched from their yard a finely-modelled steel screw steamer of the following dimensions:—Length overall 315 ft., breadth extreme 44 ft., depth moulded 24 ft. 2 in., gross tonnage about 1,850 tons. The vessel, which has been built to the order of Messrs. Wm. Johnston & Co., Ltd., of Liverpool, is on the Isherwood system, constructed to will take the highest class in British Corporation Registry, and has been built under special survey. She is of the single-deck type, with a tier of main deck beams on which a spare twenty deck will be fitted. The vessel is prepared for cargo, bridge amidships with accommodation for captain, officers and engineers in houses on bridge deck, and top gallant forecastle for crew. A cellular double bottom is fitted throughout and peak tanks are fitted for water ballast, and equipment includes electric light throughout, six steam winches (five fitted with Wilson's patent chain drive), double derricks throughout including two 12-ton derricks, derrick tables and crosstrees on masts, steam windlass with quick warping ends, stockless anchors, steam steering gear, etc., etc. The engines by Messrs. Geo. Clark, Ltd., Sunderland, have cylinders 24 in., 40 in. and 75 in. by 45 in. strokes, steam being supplied by two main and one auxiliary single-ended boilers, having a working pressure of 180 lbs. The vessel has been supervised during construction by Messrs. C. Surtees and D. Beatson, the owners' superintendents.

Jabiru.—On October 24th there was launched from the Neptune Works of Messrs. Swan Hunter & Wigham Richardson, Ltd., the twenty-second vessel built by them for the Cork Steamship Co., Ltd., of Cork, for their Liverpool and Continental trade. The vessel is 288 ft. long by 38 ft. beam, and carries 1,575 tons deadweight. She has accommodation for a small number of passengers, and is similar in construction to the other vessels built at the Neptune Works for these owners. The engines and boilers are also being constructed by Messrs. Swan, Hunter & Wigham Richardson, Ltd., the engines being of the triple expansion type, to drive the vessel at a speed of 11 knots.

Boomerang.—On October 20th Messrs. Wood, Skinner and Co., Ltd., of Bill Quay, Newcastle-on-Tyne, successfully launched from their shipbuilding yard a large steel screw steamer which has been built by them to the order of Messrs. Petter Olsen, of Christiania, Norway. The vessel is of the two-deck type, with two complete steel decks and having poop, long bridge and forecastle with steel deck houses on bridge deck amidships containing captain's and passengers' accommodation, and with flying bridge and chart room above. The officers' and engineers' quarters are in deck houses on bridge deck and accommodation for the carpenter, bosun and petty officers is provided in the poop, all together with bath and lavatory accommodation, crews' mess room and galley house on deck above. The principal dimensions of the vessel are as follows, namely:—Length, 400 ft.; breadth, 54 ft.; depth moulded, 30 ft. 3 in., with a deadweight carrying capacity of [illegible] tons on a mean draught of water. Exceptionally large water ballast capacity is provided in the cellular double bottom and in fore and after peaks. The vessel will be rigged as a two-masted schooner with telescopic topmasts and will have provision for Marconi wireless telegraphy. She has two cargo hatches with two double steel tubular derricks to each, and each capable of lifting [illegible] tons, and she also has [illegible] steam warping capstan, direct-acting steam windlass, steam-steering gear placed in the engine-room and controlled from upper and flying bridges, large searchlight, [illegible] and complete electric light installation throughout. The lifeboats are fitted on Chr. Smith' patent [illegible] davit system. The propelling machinery will be of the triple-expansion type of approved design, having [illegible] and [illegible] to [illegible] at a speed of [illegible] knots. The engines and boilers are being constructed by the Wallsend Slipway and Engineering Co., Ltd., at the Southbank Marine Engineering Co., Ltd., at the Southbank and Engine Works, Wallsend. Both the hull and machinery have been built to the requirements and under the special survey of Nicolai Veritas, and the vessel has been built to the specification of Mr. Cap. Carstens, of Christiania, Norway, consulting engineer to the owner. The vessel has also been experimented during construction by the Captain H. J. Hedstrom, who is the consulting Marine Superintendent of Messrs. Wm. Doxford & Sons, Ltd., and [illegible] supplied to lower bunkers, 'tween deck bunkers, bridge deck bunkers, and on the deck top in lower [illegible].

Indrapura.—On October [illegible] a launch took place at the Wallsend Shipyard of Messrs. Swan, Hunter and Wigham Richardson, Ltd., when the [illegible] steamship *Indrapura* was successfully launched. The naming ceremony was graciously performed by Miss Rachael Napier Royden, daughter of Mr. Ernest Royden, and granddaughter of Sir Thomas Royden, of Liverpool, managing owners of the India Line. Last year Messrs. Swan, Hunter and Wigham Richardson built for the same owners the T.S.S. *Indrawadi*, which was acknowledged by all to be an exceptionally fine vessel of her kind and well suited to the particular trade. The T.S.S. *Indrapura*, which has just been launched, is a somewhat larger ship, and shows still further improvements in many directions. Like other steamers of the Indra Line, she will be employed in carrying refrigerated cargoes from New Zealand and Australia. The construction of the *Indrapura* has been under the supervision of Messrs. Wm. Lapraik & Son, of Liverpool, the owners' consulting engineers, and Capt. Horne, marine superintendent of the India Line. The principal dimensions of the T.S.S. *Indrapura* are:—Length, [illegible] ft., breadth, [illegible] ft., and depth to the shelter deck about 44 ft. The ship is classed 100 A1 at Lloyd's, but is actually being built somewhat in excess of the strict requirements. Three of the holds and 'tween decks are modified for refrigerated cargoes, the cooling machinery being made by Messrs. J. & E. Hall, Ltd., of Dartford, Kent. Capt. Horne's patent bulkheads have also been fitted. These are most ingeniously designed so that access can be gained to the ship's double bottom and to the holds, even when the latter are full of cargo. The living accommodation for both the officers and crew has been carefully planned and will be well ventilated, making these quarters more roomy and comfortable than is often the case. There are also comfortable cabins for a dozen first-class passengers. The equipment of winches is larger than usual so that cargoes may be handled with rapidity, and there will be provided an outfit of Imperial flare lights to give brilliant illumination when loading or discharging at night. The twin-screw engines and also the boilers are being constructed by The Wallsend Slipway and Engineering Co., Ltd. The I.H.P. of each engine will be about [illegible], and there are five single-ended boilers, with a working pressure of 200 lbs. per square inch, and fitted with Howden's forced draught.

Lingan.—On October 26th Sir Raylton Dixon & Co., Ltd., launched from their Cleveland Dockyard, Middlesbrough, a fine steel screw steamer which they are building to the order of Messrs. Furness, Withy & Co., Ltd., West Hartlepool, London, etc. The vessel is of the latest improved type of patent cantilever construction with top-side water ballast tanks, and is being constructed to receive the highest class with British Corporation, single-deck type with poop, bridge and forecastle. Her principal dimensions are 388 ft. 3 in. by [illegible] ft. [illegible] in. moulded, and she will have a total weight carrying capacity of about [illegible] tons on a light draught of water. She will have eleven hatchways, four holds absolutely free from all obstructions, such as beams, pillars, or [illegible], and [illegible] and of the total amount of about 2,400 tons of water ballast [illegible] in the topside tanks. The vessel will have twelve derrick posts and twenty [illegible] steam [illegible] steering gear and [illegible] warping [illegible]

[illegible] and all the latest and most modern [illegible] for rapid handling of cargo. Triple-expansion [illegible] cylinders 26 in., 44 in. and 73 in. by 48 in. stroke, supplied with steam by three large single-ended [illegible] at 180 lbs. pressure will be fitted by Messrs. Richardsons, Westgarth & Co., Middlesbrough. The hull and machinery are being constructed under the supervision of Messrs. W. Copeman and C. H. Clayden, the owners' superintendents. Messrs. Wailes, Dove & Co.'s "Bitumastic" enamel has been applied to topside tanks and their "Bitumastic" solution to the underside of deck and beams.

Wabana.—On October 11th, Messrs. Short Brothers, Ltd., launched from their shipyard at Pallion, Sunderland, the s.s. *Wabana*, built to the order of Messrs. W. Lowden & Co., Liverpool. This steamer has been specially designed for carrying coals for the Dominion Coal and Iron Co., Sydney, C.B., with arrangements so that the cargo and bunkers will be entirely self trimming. She is built on the Isherwood system to take Lloyd's highest class, and her leading dimensions are:—Length, 389 ft.; beam, 52 ft., and depth moulded, [illegible] ft. 9 in. Water ballast is carried throughout the double bottom in fore and aft peaks and in wing tanks the full length of holds, amounting in all to about 2,400 tons. Ten large cargo hatches are fitted with steel-hinged covers. The discharging arrangements are very complete, six derricks being fitted to each mast and eight samson posts with twelve derricks worked by eleven steam winches. Steam windlass, steam-steering gear in engine-room is controlled from wheelhouse and connected to quadrant by rods and chains, and steam ash hoist will be supplied. The propelling machinery will be fitted by Messrs. George Clark, Ltd., of Sunderland, and consists of engines with cylinders 26 in., 44 in. and 73 in. diameter, and a stroke of 48 in., driven by three large multitubular boilers working at 180 lbs. pressure and fitted with Howden's system of forced draught. To enable the large quantity of water ballast to be expeditiously handled two large ballast pumps are fitted, capable of discharging 300 tons per hour. While under construction the hull and engines have been under the supervision of Mr. R. J. Williams and Captain Dougal, of Liverpool, the owners' superintendents.

Eccleshill and Emley.—On October 11th, there were launched from the yard of Messrs. Cochrane & Sons, Selby, two steel screw fleeters, the principal dimensions being 112 ft. by 22 ft. 6 in. by 13 ft. 2 in. moulded. The vessels have been built to the order of Messrs. The Great Northern Steamship Fishing Co., Ltd., of Hull. They will be fitted with powerful triple-expansion engines by Messrs. Amos and Smith, Ltd., of Hull, and will be replete with all the latest improvements for the fishing trade.

Crayford.—On October 21st, the Blyth Shipbuilding and Dry Docks Co., Ltd., launched from their shipbuilding and graving dock works the fine steel screw steamer *Crayford*, built to the order of Messrs. Wm. Cory & Son, Ltd., London. This vessel, the first of two which the Blyth Co. are building for Messrs. Cory, measures 239 ft. 3 in. in length, breadth 35 ft. 3 in., has been constructed under Lloyd's special survey for their highest class. She is of the raised quarter deck type, having long bridge and topgallant forecastle. The accommodation for the captain, officers and engineers is in the bridge, whilst the crew will be housed in topgallant forecastle. The *Crayford* is specially adapted for the coal trade, having specially large self-trimming hatches and clear holds, and is equipped with the best and latest design of deck machinery for the quick and economical working of the cargo. Triple-expansion engines of ample power will be supplied by Messrs. George Clark, Ltd., Sunderland. Messrs. Wailes, Dove and Co.'s "Bitumastic" enamel has been applied to lower side bunkers and tank top, and their patent "Bitumastic" covering to the tank top under boilers. A Cochran (Annan) donkey boiler, with patent seamless furnace, has been supplied and fitted.

Daybreak.—On October 23rd, Messrs. William Gray and Co., Ltd., launched the handsome steel screw steamer *Daybreak*, which they have built to the order of Messrs. John Wood & Co., of London and West Hartlepool. She is designed on very fine lines to maintain a good average speed, and will take the highest class in Lloyd's Register and is of the following dimensions, *viz.*:—Length overall, 351 ft. 6 in.; breadth, 48 ft. 6 in., and depth, 25 ft., with long bridge, poop and topgallant forecastle. The saloon, state-rooms, captain's, officers' and engineers' rooms, etc., will be fitted up in houses on the bridge deck and the crew's berths in the forecastle. The hull is built with deep frames, cellular double bottom and large after and fore peak ballast tanks, eight steam winches, steam-steering gear amidships, hand screw gear aft, patent direct steam windlass, all with bronze rods; boats on deck overhead, ten derricks, four outstretchers, large horizontal multitubular donkey boiler, shifting boards throughout, stockless anchors, telescopic masts with fore and rig and all requirements for a first class cargo steamer. Triple-expansion engines are being supplied by the Central Marine Engine Works of the builders, having cylinders [illegible] in., [illegible] in. and [illegible] in. diameter with a piston stroke of [illegible] in., and two large steel boilers for a working pressure of 180 lbs. per square inch.

Steel Screw Fleeter. On October 23rd, there was launched from the yard of Messrs. Cochrane & Sons, Selby, a steel screw fleeter, the principal dimensions being 112 ft. by 22 ft. 6 in. by 13 ft. 2 in. moulded. The vessel has been built to the order of Messrs. The Great Northern Steamship Fishing Co., Ltd., of Hull, and will be replete with all the latest improvements for the fishing trade. She will be fitted with powerful triple-expansion engines by Messrs. Amos and Smith, Ltd., of Hull.

Skuli Fogeti. On October 24th, there was launched from the same yard a steel screw trawler, the principal dimensions being 130 ft. 8 in. by 23 ft. by 13 ft. moulded. The vessel has been built to the order of Messrs. Fiskivedafjelagid Alliance, Reykjavik, and will be replete with all the latest improvements for the fishing trade. She will be fitted with powerful triple-expansion engines by Messrs. The Great Central Co-operative Engineering and Ship Repairing Co., Ltd., of Grimsby.

Alt.—On October 25th, Messrs. William Dobson & Co. launched from their shipbuilding works at Walker the steel screw steamer *Alt*, which is one of two vessels they are at present building for the Lancashire & Yorkshire Railway Co. for their service between Goole and Continental ports. The dimensions of the steamer are:—Length, 240 ft.; breadth, 34 ft.; depth, 16 ft. 4 in. There is one deck with long combined poop and bridge and topgallant forecastle. The lower holds are arranged for general cargo, and the whole of the poop and bridge space is fitted with stalls for carrying horses. Accommodation is provided for a few first-class passengers in comfortable cabins on bridge amidships. Electric light is fitted throughout. The lines are exceptionally fine and large power is provided to give the vessel a speed of 14 knots. The main machinery is being built by the Wallsend Slipway and Engineering Co., Ltd.; the cylinders are 22 in., 36 in. and 61 in. diameter by 39 in. stroke, and there are two large boilers fitted with Howden's system of forced draught. Messrs. Wailes, Dove & Co.'s "Bitumastic" enamel has been applied to cross bunkers and to the floor, etc., in boiler space.

Cairndhu.—On October 25th, this vessel, built by Messrs. Wm. Doxford & Sons, Ltd., Sunderland, to the order of the Cairn Line Steamships, Ltd. (Messrs. Cairns, Noble & Co.), Newcastle, was launched. The *Cairndhu* is a sister vessel of the *Cairngowan* (which Messrs. Doxford launched last month for the same owners), and is of the single-deck type. Length, 385 ft.; breadth, 51 ft., and of 23½ ft. draught. The deadweight capacity is 7,500 tons, and the classification is with the British Corporation. Messrs. Doxford are supplying the engines and boilers. Mr. C. Waldie Cairns has superintended the construction of the vessel, assisted by Captain Gibson. Messrs. Wailes, Dove & Co.'s "Bitumastic" enamels have been applied to the engine and boiler room tanks, tank top, etc.

LAUNCHES—Scotch.

Chindo.—On October 19th, there was launched at Port Glasgow a steel twin-screw steamer for the Emprezo Nacional de Navegacao a Vapor, of Lisbon. Her dimensions are:—Length, 240 ft.; breadth, 33 ft. 6 in.; depth (moulded), 21 ft. 6 in.; her gross tonnage being 1,385. The vessel, which was named *Chindo*, is intended for the Portuguese coasting trade. She has accommodation for first, second and third-class passengers, and is fitted with electric light throughout. Messrs. Wailes, Dove & Co.'s "Bitumastic" enamel has been applied to the side bunkers, cross bunkers, etc., and their patent "Bitumastic" covering to the tank tops.

Aberdon.—On October 20th, there was launched at Aberdeen a steamer which has been built to the order of Messrs. Adam Brothers, Aberdeen. The vessel, which has been speci-

ally constructed for the coal-carrying trade, will [illegible] [illegible] Lloyd's Register. [illegible] and depth [illegible] ft. [illegible] and triple-expansion engines.

Queen Adelaide. On October 21st, there was launched at Port Glasgow a [illegible] steamer, [illegible] to the order of the Danube Steamship Co., Glasgow. A duplicate vessel will be put down immediately on the vacant berth for the same owners. The dimensions of the [illegible] are: Length [illegible] ft., breadth [illegible] ft., depth [illegible] ft., [illegible] deadweight carrying capacity [illegible] tons, and gross tonnage [illegible]. The steamer was built to Lloyd's [illegible] and is fitted throughout with the latest appliances for expeditious working of cargo. The vessel will be commanded by Captain Ellwood Rutson, commodore captain of the Queen Line. After the launch the vessel was towed to the Victoria Harbour, Greenock, where machinery will be supplied. It is interesting to note that the frames for this vessel were set on exactly the same spot as the Cosmo, which [illegible] Messrs. Wailes, Dove & Co.'s "Bitumastic" covering has been applied to the tank tops.

Coolebar.—On October 21st, there was launched at Ardrossan a steel screw steamer for Australian owners. The vessel is [illegible] ft. between perpendiculars by [illegible] ft. breadth by [illegible] ft. 6 in. depth, and is intended for coasting and river traffic in New South Wales. She was built under the superintendence of Messrs. Paton & Hendry, Glasgow, and will be classed at Britain Corporation.

Lapwing. On October 23rd there was launched at Govan the steel screw steamer *Lapwing*, which has been built for the General Steam Navigation Co., Limited. The dimensions of the vessel are: Length [illegible] ft., breadth [illegible] ft., depth [illegible] ft. to awning deck [illegible] ft., and measurement about [illegible] tons gross. She has been built to Lloyd's [illegible] class, and is intended for the Company's general cargo trade between London and Continental ports. The machinery consists of a set of triple-expansion engines, steam being supplied by two large boilers working at a pressure of 180 lbs. Messrs. Wailes, Dove & Co.'s "Bitumastic" enamel has been applied to the lower side bunkers, lower room tank, etc., and their patent "Bitumastic" covering to tank top.

Montoro.—On October 24th, there was launched from the works of the Clyde Shipbuilding and Engineering Co., Ltd., Port Glasgow, a handsome steel screw steamer built specially for the well-known Australian shipping firm, Messrs. Burns, Philp & Co., Ltd., for their service between Sydney, Queensland ports, Java ports and Singapore. Built to Lloyd's highest class for this type of vessel. The dimensions of the vessel are: Length [illegible] ft., breadth [illegible] ft., depth [illegible] ft., deadweight carrying capacity about [illegible] tons. The passenger accommodation will form a leading feature of the vessel, providing for ninety first-class passengers and forty second-class passengers. The saloon of the first and second class accommodation is handsomely furnished throughout and [illegible] in world high class style. Refrigerating plant of the latest type is provided of sufficient capacity to carry the entire cargo of frozen meat, fish, fruit and butter in the cold storage chambers, which have a capacity of [illegible] ft. Electric light fans and telephones are fitted throughout. Marconi telegraphy is also a feature of the vessel. The engines and boilers have been constructed by the builders, [illegible] to give the vessel a [illegible] speed on the trials. After the launch the vessel was towed to the Yorkshire Dry Dock to receive her engines. During construction the vessel has been built under the supervision of Mr. J. D. Morrison, engineer, Glasgow. Messrs. Wailes, Dove & Co.'s "Bitumastic" covering has been applied to the engine and boiler room tank tops, and their patent "Bitumastic" covering to the lower side bunkers and lower room tank with [illegible].

Karramatta. On October 26th, there was launched at Port Glasgow a steel screw steamer, [illegible] of the following dimensions: Length [illegible] ft., breadth [illegible] ft., depth [illegible] ft., [illegible] deck. The vessel has been built to the order of the Stoomvaart Maatschappij Nederland, of Amsterdam, for their Eastern service and pilgrim trade. After the launch the vessel was towed to the Victoria Dry Dock, where she will receive her triple-expansion engines, having cylinders 27½ in., 47 in. and 82½ in. by [illegible] in. stroke.

Hopper Dredger.—On October 26th, Messrs. Wm. [illegible] and Co., Ltd., Renfrew, launched a [illegible] hopper dredger, built to the order of the Lyttelton Harbour Board, for the Port of Lyttelton, New Zealand. The vessel is fitted with [illegible] capable of raising and discharging 2,000 tons of material [illegible] hour. Compound surface condensing [illegible] for [illegible] is supplied from two cylindrical multitubular [illegible] constructed for a working pressure of [illegible] lbs. The main [illegible] pumps are connected to the suction [illegible] fitted in central well at stern, and powerful water jets are [illegible] on the nozzle at the bottom of suction pipe for [illegible] soft material. When it is proposed to deal with harder material the nozzle is substituted by a spud [illegible] driven through a line of sliding fittings on upper side of suction frame, and machine cut-steel gearing actuated by a set of powerful independent compound engines. The hopper doors are controlled by powerful hydraulic gear, the power being supplied from one duplex set of [illegible] pressure pumps. The hopper arrangements include "Simons" patent suction fittings which enable the load in the hopper to be [illegible] overboard for reclamation purposes. The vessel was designed under the direction of Mr. Cyril J. Williams, engineer-in-chief to the Lyttelton Harbour Board, the construction being carried out under the direction of Messrs. Gardner and Elliot, consulting engineers, London, represented by Mr. R. M. E. Ashworth, resident inspector, and has also been built under special survey by Lloyd's, to their full requirements. The ceremony of naming the vessel was performed by Mrs. Ashworth, Hazelwood, London.

Glenartney. On October 27th, there was launched at Whiteinch the steel screw steamer [illegible] built for Messrs. James Gardiner & Co., Glasgow. The vessel, which has been built to Lloyd's highest class, is of about [illegible] tons gross. Triple-expansion engines will be supplied. Messrs. Matthew Keenan & Co., Ltd., have the contract to install boiler and pipe with their non-conducting composition.

Talthybius. On November 7th, Scotts' Shipbuilding and Engineering Co., Greenock, launched the *Talthybius*, a steamer of 13,500 tons deadweight, which they have built for the Holt Line, of Liverpool. The dimensions of the vessel are: Length [illegible] ft., breadth [illegible] ft., depth [illegible] ft. [illegible]. The screw machinery will be supplied by the builders. The equipment of the vessel includes twenty-one derricks, one of which is capable of lifting [illegible] tons, and twenty-six winches. Accommodation is provided for [illegible] passengers. The vessel is intended for the owners' special trade between Great Britain and Australia, returning via the Pacific.

Princess Sophia. On November 8th, Messrs. Bow, McLachlan & Co., Paisley, launched the Canadian Pacific Railway steamer *Princess Sophia*. The new vessel, which is the largest yet built on the river Cart, is a single screw steamer [illegible] ft. in length, 44 ft. in breadth, and [illegible] ft. in depth, moulded, and is specially designed for passenger service on the Pacific coast. The steamer is fully appointed as a first-class passenger steamer, with accommodation for about [illegible] passengers. The main deck is largely set apart for freight service, the passenger accommodation being all arranged on the upper deck, promenade deck, and bridge deck. In addition to the state rooms on these decks for the accommodation of first class passengers there is on the upper deck a large [illegible] hall finished in mahogany, with a dining-room aft finished in satinwood and mahogany. Accommodation is provided for about [illegible] second-class passengers. Triple-expansion engines designed to give a speed of about [illegible] knots will be supplied by the builders.

Mandalay. On November 9th, there was launched at Dumbarton the steamer *Mandalay*, a vessel of the same type built to the order of Messrs. [illegible] Glasgow. The dimensions are: Length [illegible] ft., breadth [illegible] ft., depth [illegible] ft. [illegible] purely for cargo purposes, and is fitted with [illegible] appliances for loading and discharging. A refrigerating chamber of special type [illegible] the supply of fresh provisions, when the [illegible]. Triple-expansion engines will be installed.

Normannia.—On November 9th, the [illegible] the turbine [illegible] which they have built for the Great Western and South Western Railway Co. [illegible]

[illegible] Parsons geared turbines.

Bruselas. [illegible] Pigeas Penthouse recently [illegible] which they have built for the Argentine Navigation Co. Nicola [illegible] Buenos Aires. The *Bruselas* is a handsome saloon river steamer, 265 ft. in length and 37 ft. in [illegible] with [illegible] accommodation for [illegible] passengers. The vessel will be fitted in the Rosario, where she will be supplied with engines and boilers by the builders.

Mavis. The Aldie Shipbuilding Co. Troon recently launched the single-screw steel steamer *Mavis* which they have built for the General Steam Navigation Co. London. The dimensions of the vessel are: Length 245 ft. breadth, [illegible] ft. [illegible] depth moulded to main deck 20 ft. 6 in. [illegible] the most up-to-date appliances for the rapid loading and discharging of cargo, and accommodation will be provided for a limited number of passengers in first class state rooms situated midships. Machinery is being supplied by the builders.

Afton. Messrs. Dunlop Bremner & Co. Ltd. Port Glasgow recently launched the passenger and cargo steamer *Afton* which they have built for Messrs. William Sloan and Co. Glasgow. The vessel, which will be engaged in the coasting trade between Glasgow and Bristol, is 240 ft. in length, [illegible] ft. in breadth and [illegible] ft. in depth. Machinery will be supplied by the builders. The *Afton* is the first vessel launched from the Inch Works since it was taken over by Messrs. Dunlop Bremner & Co. The order for the vessel was placed with their predecessors, Messrs. David J. Dunlop & Co.

LAUNCHES—Irish.

Ekma. On October 22nd the new twin-screw steamer *Ekma* was successfully launched from Messrs. Workman, Clark & Co.'s South Yard, Belfast. The *Ekma* has been built for the British India Steam Navigation Co., Ltd., and is a sister ship to the *Egra* which left this port a few weeks ago. The vessel is 424 ft. in length with a gross tonnage of over 5,100, and has been constructed under special survey for the highest class in Lloyd's Registry of Shipping, besides complying with the British Board of Trade requirements for a first-class passenger steamer. Accommodation for about fifty first-class and forty second-class passengers is provided in state-rooms on the shade deck, while native steerage passengers will be accommodated in the 'tween deck spaces. The vessel will be propelled by two sets of triple-expansion engines of improved type, with four large steel multitubular cylindrical boilers working under forced draught.

Enda.—On October 26th, a new steamer, named *Enda*, was launched at Dublin, to the order of Messrs. Michael Murphy, Ltd., of Dublin, Liverpool, Cardiff and Swansea, for their general cargo trades. Her dimensions are:—Length, overall 298 ft., width, 30 ft. 6 in., and depth, 14 ft. 6 in. She has been built to class 100 A1 at Lloyd's. She is a single screw steamer of the raised quarter-deck type, with machinery aft, while her hatches are particularly large and the holds entirely void of obstructions. Her machinery, by Messrs. Ross & Duncan, Govan, will consist of a powerful set of compound engines supplied with steam from a boiler of extra large capacity, and will be capable of giving her a loaded speed of 10 knots.

Deseado.—On October 26th, the *Deseado* was launched from the yard of Messrs. Harland & Wolff. The *Deseado* has been built for the Royal Mail Steam Packet Co. and is a sister ship to the *Demerara* and *Desna*, building at the same yard, and are intended for passenger service to Brazil and the River Plate. The vessels are twin-screw. Her dimensions are as follows:—Length, 517 ft. 3 in.; breadth, 62 ft. 3 in.; gross tonnage, about 11,200. The first-class dining saloon on the awning deck will seat 120 persons, at small rectangular tables. The first-class smoking-room on the bridge deck and the first-class lounge at the forward end of the same deck are sumptuous rooms. The first-class state rooms are situated on the bridge deck, and a provision which will be very popular with the passengers is that every first-class cabin has an electric fan. The second and third-class accommodation is very good. There are barber's shop, purser and doctor's rooms and surgery in convenient situations. The *Deseado* will carry a large quantity of cargo, having holds insulated for the conveyance of chilled or frozen meat. There are also compartments insulated for dairy produce and fruit. The appliances for working ship and cargo are of the most modern type. The vessel will have a complete installation of electric light and submarine signalling apparatus. The engines are arranged on the "balanced" principle which has been so successful in eliminating vibration, and with the large airy cabins, electric fans and good promenades, these vessels will be exceedingly comfortable for passengers. Captain G. M. Hicks, marine superintendent, and Mr. James E. Wimshurst, superintendent engineer, represented the owners at the launch.

TRIAL TRIPS.

Sixaola.—On October 20th, the new fruit-carrying steamer *Sixaola* left the Alexandra Wharf and proceeded down the Lough for adjustment of compasses, afterwards undergoing the speed and general machinery trials, giving the utmost satisfaction under all conditions. The vessel then left the Lough for Holyhead, where she will embark passengers for the voyage out to the West Indies. For Launch, see October issue.

Glensloy. The new steamer *Glensloy*, of 3,000 tons, built by Messrs. A. Rodger & Co., Port Glasgow, for Messrs. Easton, Greig & Co., Glasgow, recently ran her trials on the Firth of Clyde.

Koopa.—The new twin-screw passenger steamer *Koopa*, built and engined by Messrs. Ramage & Ferguson, Ltd., for the Brisbane Tug and Steamship Co., Ltd., Brisbane, Queensland, recently completed satisfactory trials on the Firth of Forth, a speed of over 16 knots having been obtained on the measured mile. A feature of the trial was the absence of vibration, the vessel proving herself most comfortable at all speeds. For Launch, see October issue.

Overton.—On October 24th, the new coasting steamer *Overton* was taken to sea for her official tests. Notwithstanding a strong sea, the vessel easily maintained her guaranteed speed of nine knots with her full cargo on board. She has been built by Messrs. J. T. Eltringham & Co., of South Shields, for the Overton Steamship Co., Ltd., of Liverpool. On the trials the propelling machinery worked without the slightest hitch. The vessel will be under the command of Captain Barton. For Launch, see October issue.

Meroe.—On October 24th, the handsome steel screw passenger and cargo steamer *Meroe*, built by Sir Raylton Dixon & Co., Ltd., Cleveland Dockyard, Middlesbrough, to the order of Messrs. James Moss & Co., of Liverpool, proceeded to sea for her official trials. The trials passed off most successfully and the vessel proceeded direct to Liverpool under the command of Captain C. R. Stewart. The vessel has been constructed to the designs and specifications and under the supervision of Messrs. Wm. Esplen & Sons, consulting engineers and naval architects, 31, James Street, Liverpool. For Launch, see October issue.

Acajutla.—On October 24th, the Salvador Railway Co.'s new steamer *Acajutla*, which has just been completed at the Neptune works of Messrs. Swan, Hunter & Wigham Richardson, Ltd., sailed from the Tyne for Salvador, Central America. She is expected to arrive there in good time to join her sister vessel, the *Salvadar*, in carrying the new season's coffee. On the trial trip, which took place about a week before her departure, the engines worked without the slightest hitch, although the weather was by no means propitious, and a speed of 12½ knots was attained. The sister vessel *Salvador*, built two years ago by the same builders, went out to Salvador, 12,500 knots, without a stop, and since then has earned a name for herself for the regularity of her passages. For Launch, see November issue.

Dalewood.—On October 26th, the loaded trial trip took place of the s.s. *Dalewood*, built by Messrs. Robert Thompson and Sons, Ltd., of Southwick Yard, Sunderland, to the order of Messrs. Wm. France, Fenwick & Co., Ltd., of London and Sunderland. The trial was most successful, and notwithstanding the unfavourable weather and heavy sea running, the speed results more than fulfilled expectations, the guaranteed speed of 10½ knots fully laden being exceeded, the average on six consecutive runs over the measured mile being 10¾ knots, the engines running with the utmost smoothness, and Mr. J. E. Dawson, who represented the owners, expressed entire satisfaction with the vessel and machinery.

A Cochran [illegible] with patent [illegible] furnaces has been supplied and fitted. For Launch, see November issue.

Tivives.—On October 28th, the new fruit cargo steamer *Tivives* left Belfast Harbour and proceeded down the Lough for adjustment of compasses and general preliminary trial speed trials. All of these tests were satisfactorily carried out, and the vessel afterwards left for Holyhead to embark passengers for her first voyage to the West Indies. The *Tivives* is intended for service between the West Indies and the United States ports, and is 394 ft. in length with a gross tonnage of over [illegible]. A special feature of the vessel is the accommodation for her [illegible] first-class passengers, a number of the staterooms being arranged that they can be engaged as family staterooms, while a couple of specially furnished cabins de luxe are arranged on the bridge deck. The dining saloon, music room, entrance hall, and lounge and smoke-room are all excellent examples of artistic decoration and furnishing. The cargo space is divided into eight compartments specially cooled for the purpose of preserving fruit cargoes in good condition. The vessel is propelled by a set of triple-expansion engines supplied with steam from two single-ended steel boilers working under forced draught. The vessel has been built under special survey for the highest class in the British Corporation Registry of Shipping, and also to all the requirements of the British Board of Trade and the United States Steamship Passenger Inspection.

Swift. Recently steam trials of the new s.s. *Swift* [illegible] tons gross were completed on the Firth of Forth most successfully, and the vessel sailed from Leith on her first voyage well loaded with general cargo. Built for the General Steam Navigation Co., Ltd., of London, by Messrs. Ramage and Ferguson, Ltd., Leith, the *Swift* is a notable addition to their well-known fleet, having a sea speed of between 13 and 14 knots, and all the most modern appliances for economical and efficient working.

Turkistan. On November 4th, the large steel screw steamer *Turkistan*, built by Messrs. Wm. Gray & Co., Ltd., for Messrs. Frank C. Strick & Co., Ltd., of Swansea and London, was taken for her trial trip. An extended trial was made, the results obtained being highly satisfactory both in regard to ship and machinery. The vessel afterwards proceeded to Middlesbrough to load. For Launch, see November issue.

Scawby.—On November 6th, the s.s. *Scawby*, built by Messrs. Ropner & Sons, Ltd., of Stockton-on-Tees, made her official trial trip in the Tees Bay. The steamer, launched on October 7th, has been built to 100 A1 Lloyd's, and is for Messrs. R. Ropner & Co., West Hartlepool. She is about 425 ft. 6 in. long and has a deadweight carrying capacity of about 6,200 tons. Her outfit is thoroughly up-to-date and includes stockless anchors, quick-warping steam windlass, steam-steering gear amidships and powerful screw gear aft, whilst she is particularly well equipped with derricks and winches of the most modern type in order to facilitate the loading and discharging of heavy cargoes. The accommodation for captain, officers and engineers is in houses on bridge, with the crew in the forecastle. The engines are of the triple-expansion type of about 1,300 i.h.p., by Messrs. Blair & Co., Ltd., of Stockton-on-Tees. The vessel has been built under the superintendence of Mr. Nicholson, and on trial she behaved in a thoroughly satisfactory manner. After some very satisfactory trial runs, during which the vessel attained a speed of over 10½ knots, she proceeded to Tyne Dock to load.

Gifford.—On November 8th, the steel screw steamer *Gifford* built by Messrs. The Northumberland Shipbuilding Co., Ltd., Howdon-on-Tyne, to the order of Messrs. Andrew Weir & Co., London, left the Tyne for her official trial trip. The vessel is 360 ft. long by 50 ft. beam by 26 ft. deep, and has been built under special survey to the highest class at Lloyd's. She is fitted with long bridge, long poop, top gallant forecastle, the accommodation, which is very comfortably fitted in steel houses on the bridge deck. The tween decks are lofty and contain [illegible] passenger cargo may be carried if necessary. Very special attention has been paid to the loading and discharging gear, and a complete outfit for the rapid handling of cargoes arranged for, consisting of ten steam winches by Messrs. Clarke, Chapman and Co., Ltd., Gateshead-on-Tyne; a large number of cargo derricks and steam windlass by Messrs. Emerson, Walker and Thompson, Bros., Darlington. She is fitted with the usual water ballast arrangement for light passage. The machinery has been supplied by Messrs. Richardson, Westgarth & Co., Ltd., Sunderland, consisting of engines with cylinders [illegible] in diameter, [illegible] stroke, fitted with [illegible] boiler with [illegible] pressure. The vessel [illegible] 7,[illegible] tons on a light draught and [illegible] at sea. During construction the vessel was [illegible] tended by Captain Gray on behalf of Messrs. Andrew Weir and Co. The trial trip proceeded in every way satisfactorily and a speed of [illegible] was attained.

Penhale. On November 4th, the handsome steel screw steamer *Penhale* was taken from the yard of Messrs. Wm. Gray & Co., Ltd., West Hartlepool, for her trial trip. She has been built for Mr. Richard B. Cowling, of Hull, to Lloyd's highest class. Her principal dimensions are:—Length overall [illegible] ft., breadth [illegible] ft. and depth, 25 ft. 11 in. The vessel was launched on October [illegible]. She has a long bridge, poop and forecastle. The saloon, state-rooms, captain's office, and engineers' [illegible] are fitted up in houses on the bridge deck, and the crew's berths in the forecastle. The hull is built with deep frames, cellular double bottom and long aft and fore peak ballast tanks. Steam steering gear amidships, hand screw gear aft, patent [illegible], and two large horizontal multitubular boilers. Under steel grain divisions, stockless anchors, telescopic masts with fore and aft rig, boats on deck overhead, and all the requirements for a first-class cargo steamer and for Admiralty transport work have been fitted. Triple expansion engines have been supplied from the Central Marine Engine Works of the builders, having cylinders 25 in., 40½ in. and 67 in. diameter, with a piston stroke of 45 in., an evaporator, duplex pumps, and other auxiliaries of the "Crown" make. Steam is generated in two large steel boilers adapted for a working pressure of [illegible] lbs. per square inch. After adjustment of compasses the usual full speed trials were made, with highly satisfactory results, the vessel afterwards proceeding on her voyage to Newport to load.

Chelohsin. The twin-screw steamer *Chelohsin*, which has been built at Dublin for the Union Steamship Co., Vancouver, attained a speed of 14.[illegible] knots during recent trials on Belfast Lough. The vessel afterwards left for Vancouver. For Launch, see August issue.

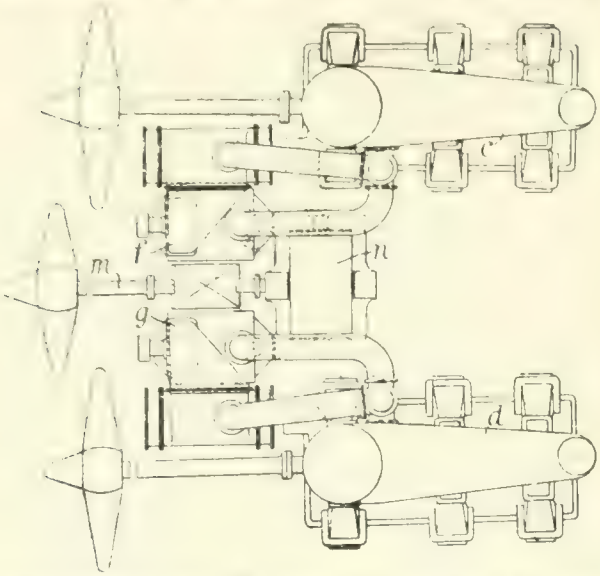
Orama.—The new Orient liner *Orama*, the sixth vessel built by the Orient Steam Navigation Co., for the Commonwealth mail service went on her trials recently. The trials consisted of progressive runs on the measured mile, continuous runs between Cloch and Cumbrae, at 18½ knots, and a 36-hours' trial, of which 18 hours was at 17½ knots, and 18 hours at 14½ knots. The coal consumption was accurately measured on these long distance trials, which were carried out on the passage round to Tilbury. In the *Orama* the Parsons low pressure turbine is placed aft of the reciprocating engines, the steam from which latter can be led either to the turbine or, when manœuvring, direct to the main condenser through suitable change valves. The turbine is 11 ft. 6 in. in all diameter, and is so designed that at the various speeds required on service it transmits about [illegible] of the power. As a conclusive illustration of the advantage of this system it was found that when burning a single low quality of fuel per unit of grate surface, nine single-ended boilers sufficed where ten, of the same size were required in the previous five vessels of the fleet; and this despite the fact that the *Orama* is of 6 per cent. greater over all dimensions, and that on the trials of the ships referred to, very notable results as regards economy were obtained. For Launch, see August issue.

City of Birmingham.—On November 11th, the new twin-screw modelled steel screw steamer *City of Birmingham*, which has been built by Palmers Shipbuilding and Iron Co., Ltd., to the order of the Elder and Dempster Lines, Ltd., has taken her trial trip. The trial was satisfactory in every respect, the engines working well, the speed being about 14 knots. At the conclusion of the trial the vessel returned to the Tyne prior to leaving for her first outward voyage. It is interesting to note that the *City of Birmingham* is the first vessel built by Palmers for the new Elder and Dempster Lines, the last one being launched by them early this year from the yard of Messrs. Robert Stephenson & Co. For Launch, see October issue.

The Marine Engineer and Naval Architect Patent Record.

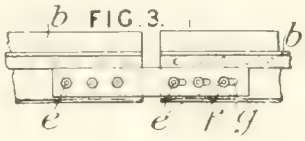
Compiled by Messrs. F. P. Alexander & Son, Chartered Patent Agents, 166, High Holborn, London, W.C.

16,346. Turbines. In a three-shaft marine installation, the outer shafts are driven by reciprocating engines *c*, *d*,



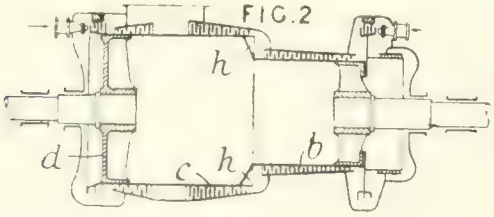
while the centre shaft *m* is driven by turbines *f*, *g* through gearing *n*. When a reciprocating engine is running ahead, it exhausts into its corresponding turbine, but when running astern, it exhausts direct to the condenser, the turbine running idle.

16,809. Hatches and Hatchways.—For temporarily closing a hatchway when the ship is in port, without replacing the heavy thwartship beams in the hatchway, the fore-and-aft beam sections are coupled together so as to form a single composite beam which is used to support the hatch covers.



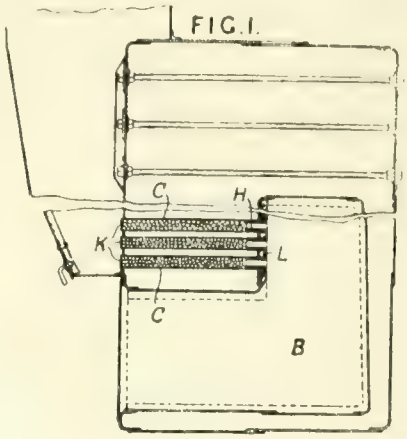
The beam sections *b* are coupled together by means of plates *f* and bolts *e*, and liners or packing plates may be interposed between the plates *f* and the web of the beam. By means of slots *g* in the plates *f*, the length of the composite beam may be adjusted.

16,990. Turbines (End-balancing).—A combined ahead and astern turbine, each part comprising impulse and reaction stages, is provided with a balancing-piston subjected on one



side to pressure intermediate between that of the inlet and exhaust of the forward turbine, and on the other side to the pressure of the impulse section of the reversing turbine. In one form the balancing piston is formed by a step between the two parts of different diameter of the forward turbine. In the form shown in Fig. 2, the piston *d* is subjected to steam pressure reaching it through holes *h* in the rotor between the parts *b*, *c* of the forward turbine.

17,560. Marine-type and like boilers.—Liquid or gaseous fuel is burnt in the combustion chamber B and the resulting products are drawn by a fan or other suction device in the uptake through tubes C packed with granular refractory material. This material is held in place at one end of the tubes by grids K and at the other end by fire-clay plugs H,



the heads of which are enlarged to retain a gannister or like lining L on the tube-plate. After leaving the boiler, the gases are passed through a feed-heater, the tubes of which are also packed with refractory material. The chamber B may be within the shell of the boiler, as shown, or it may be in proximity to the shell.

WORSHIPFUL COMPANY OF SHIPWRIGHTS.—At the Court Meeting of the above Company, held on November 7th, the Hon. Sir Charles A. Parsons, K.C.B., and Mr. C. E. Ellis, the managing director of Messrs. John Brown & Co., Ltd., took the oath as Assistants and were made members of the Court. The following candidates were admitted in due form to the Freedom and Livery of this ancient Company:—Mr. H. Rowell, a director of Messrs. Hawthorne, Leslie & Co., Ltd.; Mr. A. W. Sampson, shipyard manager of the Fairfield Shipbuilding and Engineering Co.; Mr. J. H. Boolds, a special director of Messrs. Vickers, Ltd.; and Mr. G. J. Carter, the shipyard manager of Messrs. Armstrong, Whitworth & Co., Ltd. Among the candidates for election who were nominated were Mr. H. C. Yarrow, of Scotstoun; Mr. E. H. Mitchell, of Messrs. Cammell, Laird & Co., Ltd. It was reported at the meeting that a Liveryman of the Company, Mr. G. Briggs, C.C., had been elected as a Sheriff of the City of London. A Court Dinner followed the above meeting, and among those who attended were the following, The Master, Dr. Clement Godson, V.D., being in the chair:—Col. Hon. H. W. Lawson, M.P.; Lieut.-Col. Viscount Hythe; Mr. T. L. Devitt; Sir Edward Busk, Prime Warden of the Fishmongers' Company; Professor J. H. Biles, LL.D.; Mr. A. R. T. Woods; Mr. Archibald Denny; Mr. J. Bell White, Senior Warden; Mr. John Weir; Col. Sir William H. Dunn; Mr. J. Last Sayer, C.C.; Sir John Wrench Towse; Mr. T. H. Openshaw, F.R.C.S., C.M.G.; Mr. R. Temple Thompson; Mr. F. W. Manuelle; Mr. H. W. S. Baden-Powell, K.C.; Mr. E. C. Kirkness; Mr. A. J. Fells; Col. T. Davies Sewell, F.R.A.S.; Mr. H. Rowell; Mr. J. H. Boolds; Mr. A. W. Sampson; Mr. G. J. Carter; and Mr. H. E. Yarrow.

XMAS PRESENTS.—Technical books form a suitable Xmas present, and the publisher will be pleased to pack and despatch any book to any address at home or abroad on receipt of order.

The Marine Engineer

And Naval Architect.

LONDON, JANUARY, 1912.

REVIEW OF THE YEAR.

THE burden of 1911 contains a tangled skein which will require deft hands, guided by a wise discrimination, to unravel, that the good threads may be woven into the high affairs of the nation for the well-being of the people. There has been a tendency of recent years to remove the responsibility from the individual and place it upon the community, thus reducing disciplinary control, which, begun in the home and continued at school, is rendered more easy of completion in the workshop. There is also a tendency to reduce the incentive to thrift, and to disturb the well-spring, whence flow the waters of humanity and sympathy. The unrest which has prevailed in communities in various parts of the world fortunately shows signs of quiescence. From a sensible and patriotic view it seems the height of folly to permit the raucous voice of the enemy under guise as a quondam friend of labour to proclaim against capital from which, humanly speaking, is provided work for the worker and bread for the eater. The birthright of man is to labour, and his glory to give of his best, upholding a high ideal of duty. The law of action and re-action, it is hoped, will influence the baser tendencies in the coming days, and combat the undesirable elements, that the dignity of manhood may be maintained above the sordid. It was not by half-hearted service and keeping back part of the price that the generations that have passed earned the position handed to their successors, and it behoves us to let our minds dwell upon this and exert our influence accordingly to bring about the best results.

The position and extent of the coalfields of Britain and their possible exhaustion within a measurable time have been brought into prominence during the year, and have been the means of directing attention to the reduction of coal consumption and to the economies which may be effected in various directions, while the abatement of smoke has deservedly received close attention from several authorities. The proposed legislation regarding collieries and the safety of the workers is a matter which promises well for the future, as does the reconsideration and probable amendment of the much vexed Eight Hours (Miners') Act.

The extension of wireless telegraphy has been considerable, so that now there are stations within reach of all the great sea routes; further new stations are in course of construction. The advantages gained by an installation on shipboard are so manifest that from a national point of view the tendency is to include such among the compulsory requirements—incidentally the use of a universal language, or the wider knowledge of codes and languages will be encouraged among engineers and professional operators.

The internal combustion engine for marine service has moved forward apace. Its adoption, however, has been chiefly for small coasting and fishing vessels and barges, with the addition of a few larger vessels, including sailing ships fitted with auxiliary power for use in calms, and working out of or into harbour. The advantages of the oil engine in connection with the very important fishing industry on which much of the food supply of the nation depends, has been made so obvious in the course of the season that the support which has been appealed for by the fishermen should be favourably entertained by the authorities. The initial cost of the internal combustion engine is high compared with steam plant, and this has to some extent militated against it for large powered vessels, discounting the consideration of lower running costs to some extent, while there is ever in view the possibility of rises in the price of oil against coal.

Aerial navigation has progressed somewhat, and the whirring of the motor aloft has been more frequently heard in the land, while many schemes are afoot to utilise the atmosphere as a medium of transit for passengers to travel to and fro. The carriage of the letter post was a step towards this.

The increasing dimensions of steamers for passenger lines have been very marked towards the close of the year. It appears that the thousand feet length is on the eve of being reached within the half-century from the *Great Eastern*, and one century from the *Comet* and *Charlotte Dundas*. The excellent appointments of the recently built passenger steamers are features which appeal to the most fastidious ocean traveller by the luxury of his surroundings, as they also claim the admiration of his visitors. Trade and commerce have been on the rising tide of prosperity at home and abroad, and it is still on the flow; exports and imports being on the increasing ratio. Emigration has been also great, due to causes which may be faced or fought over during the coming year, to determine whether the goose or the egg is best. Shipbuilding and engineering returns show considerable advance, and other industries have provided plentiful employment for those engaged in most of the enterprises demanding the outlay of capital and the assiduous forethought and attention which command success in such undertakings. Prosperity has not been confined to Britain, but has been evidenced in the advances made throughout the Empire in great developments and industrial undertakings; these have largely contributed to maintain employment in the homeland and elsewhere. Harbour and Railway extensions to meet the developments consequent upon the largely encouraged migration of those who have been specially selected as desirable settlers; vessels for ocean and intercolonial traffic to satisfy the demands and growing re-

quirements of expanding states; and the establishment of new industrial works to reduce the importation of what may be manufactured within the prescribed area, have each and all helped to swell the volume of trade. All these elements have been very prominent during the year. The onward march of Delhi, on account of the recent announcement regarding the change in the seat of government, will not only involve a large expenditure and opening up of territory with historic associations, but will turn a volume of trade and commerce in a direction hitherto not so much sought after as the more frequented routes in India. Eastern nations have been rousing themselves to the possibilities before them, and with the encouragement to develop their wealth of minerals, and the painstaking ability some of them undoubtedly possess in a marked degree, it is fitting that capital and labour in the west should consider carefully the position, lest the balance from their joint product be overwhelmed by the close competition growing around the lands of the rising sun.

Our journal, thanks to its many friends, subscribers and contributors, has shared in the general prosperity, and in looking forward to the entering year we do so with hopeful confidence, and desire to express our best wishes for the success and well-being of all who read our pages, and these embrace engineers and members of industrial undertakings all over the world.

"HAWKE"-"OLYMPIC" COLLISION.

THE cross-actions arising out of the collision which took place between H.M.S. *Hawke* and the White Star Liner *Olympic*, in the Solent, on September 20th last, occupied the attention of the Court from November 16th to the 28th, and the judgment of the President was given on December 20th. The substance of the judgment is that the *Olympic* was alone to blame, and that the negligent navigation was solely that of her pilot, who was compulsorily in charge. The effect of these conclusions is that judgment was entered for Commander Blunt of the *Hawke* in the first action and for the owners of the *Olympic* in the cross-action by the Admiralty upon the defence of compulsory pilotage. As to the costs, the President decided that in the first action Commander Blunt was to have his costs, and in the second action both sides were to pay their own costs, which we understand means that as the two actions were tried together Commander Blunt only gets one half of his taxed costs. We feel sure the result has caused considerable surprise, not only among underwriters, but also among a large section of the public who have watched the proceedings with great interest. The questions at issue were those of fact rather than of law, and evidence presented by the parties was of a very conflicting character. The main issue for decision was narrowed down to two questions, *viz.*:—Was the *Hawke* the overtaking vessel and the *Olympic* the overtaken vessel? or were they crossing vessels? In order to determine the point it was necessary for the Court to look at the whole of the evidence, and especially to come to a definite conclusion as to the spot of the collision, the courses of the vessels, their speeds, bearings and distances, and their helm actions at the material times. The conclusions arrived at by the President were the result of a long and highly technical analysis of the evidence, and from a careful examination of such analysis it is difficult to see how any other conclusions could have been arrived at. A noticeable point in the case was the superior position occupied by the Admiralty in the presentation of their case compared with that of the owners of the *Olympic*, and having regard to the fact that the evidence given by the naval officers at the enquiry held two days after the collision was materially the same as that given at the trial, coupled with the exactitude with which their stated position of the collision was arrived at, put a more reliable value on the evidence of the naval officers than could be accorded to the evidence of the *Olympic* witnesses, without affecting the honesty of the views expressed by the latter. The President answered the main question by deciding that the *Hawke* was never the overtaking vessel, and that as they approached one another on crossing courses, the *Olympic* ought to have given way to the *Hawke*. This decision involves the interesting point that having regard to the angle of the converging courses being only fifteen degrees it was clear to the pilot of the *Olympic* that he was not on a parallel course to that of the *Hawke*. This point seems to have been quite clear to the officers of the *Hawke*, and it is somewhat surprising that no signal was given to the *Olympic* that she was crowding the *Hawke* on to the buoys on her starboard side. If this had been done in good time the *Olympic* could have altered her course more to the east and given the *Hawke* more room; or an alternative procedure could have been adopted, *viz.*: to have eased the speed of the *Hawke* for a minute or two so as to enable the *Olympic* to draw away and leave the water to the north unrestricted for the *Hawke* to run into. This was admitted by one of the *Hawke's* officers, and the regret is, that such a course was not followed. Another point of interest which is still shrouded in mystery is, if two vessels are on courses fifteen degrees apart, and one vessel is travelling faster than the other, how it comes about that one vessel suddenly swings out of her course and apparently strikes the other at right angles, judging from the character and extent of the damage done. Having regard to the altered conditions which now obtain, it seems that the present cast-iron regulations as to navigation should undergo review, and further, whether having regard to the commercial shipping now using the Solent, it would not be wise to conduct

steam trials in other waters. Just a word on the suction theory. It is difficult to understand why this was put forward as a supplementary defence, and it may be pointed out that if the action really existed, why did it not draw the vessels together as a whole instead of swinging the head of the *Hawke* round nearly at right angles while travelling at 15 knots, as is suggested. Frankly the suction theory has no fascination for us, and in our view it had too great a prominence in the case.

THE DECLARATION OF LONDON

WE have in previous issues dealt with the details of the Declaration of London, and it is interesting to now chronicle a further step. The Naval Prize Bill, which deals with the ratification of the Declaration having passed through its three stages in the House of Commons with a diminishing majority at each stage, has now been thrown out by the House of Lords on the second reading. This action clearly indicates that their lordships consider that further investigation should be given to the matter. We welcome this decision having regard to the division of public opinion on the question. As we have previously stated, exception is strongly taken to the proposed international code, and more particularly to the constitution of the court which was to be entrusted with the administration of such code. We believe that if the question of the court were put upon a satisfactory basis, the prospect of a satisfactory solution of the difficulties is by no means hopeless. It will be remembered that the points of objection include the following: That in time of war our food supply would suffer, our power of blockading our enemies' ports would be lessened and our enemies possessing nothing like our number of warships would be able unhindered to fit up their merchantmen in mid-ocean to attack us. In the debate in the House of Commons one speaker stated that the Bill if passed would be the sacrifice of this country as a great naval power of the world to the great military Powers of the Continent. It would seem that if at any time we are at war with any of the signatory Powers or a combination of them, the code would entrust to those Powers the right of making the law which would bind our fleet when the critical time arrives. It is quite conceivable also that judges appointed to the International Court would act under the instructions of their Governments, or perhaps of their Admiralties, and it hardly appears desirable that such should administer the law for the British fleet in the time of war.

[illegible]

Cylinder [illegible]

THE LEAKAGE STEAM IN A PARSONS TURBINE.

THIS note refers in particular to that type of Parsons turbine usually adopted for driving electric generators, and in which the rotor has reaction blading in all three stages. The principles apply equally well, however, to other combinations of Parsons turbines.

A convenient form of division for the three stages is to arrange for equal work in the high pressure and intermediate sections and double the amount of either for the low pressure section. Starting with an initial steam pressure of 150 lbs./in.^{2} absolute this gives the initial pressure for the intermediate section as 50 lbs./in.^{2} and for the low-pressure section as 15 lbs. in.^{2} absolute. We take the condenser pressure as 1 lb./in.^{2} absolute. If we could arrange for 1 B.Th.U. to be abstracted in each row of blades we would require approximately 40 rows of fixed blades and 40 rows of moving blades in the high-pressure section, 40 rows in the intermediate section, and 80 in the low-pressure section, making in all about 320 rows of blades, each utilising one thermal unit. This being an unsuitable arrangement from a practical point of view the real turbine would be made with 40 rows of fixed and 40 rows of moving blades in the high-pressure section, 20 rows of each in the intermediate, and 20 rows in the low-pressure, making 160 rows in all. The result of such a combination is that the steam velocity in the low-pressure section is double that in the high pressure section and the intermediate $\sqrt{2}$ times the high pressure.

The ratio of blade speed to steam speed measured at mean diameter would be made constant throughout the turbine as far as practicable. The peripheral speed at the low-pressure end limits the diameter for a given number of revolutions per minute and the mean diameter of the high-pressure section would be approximately half that of the low-pressure section, the factor for the intermediate being about $\sqrt{2}$. In manufacturing a line of turbines for sale the same ratio of blade speed to steam speed could be adopted throughout, and the diameter of each machine (at mean blade height) made to work in with the number of revolutions per minute so as to give one blade speed for the whole line. In dealing with the leakage steam the minimum distance between blade tips and casing is fixed by mechanical reasons only, and there is no reason why it should be greater at the high-pressure end when measured but that at the low-pressure end—in fact it is just the reverse in practice. If, therefore, we take this clearance as constant with the diameter in the ratio $\frac{\text{clearance height}}{\text{blade height}}$ we find is greater at the high-pressure end than at the low-pressure. For the purpose of calculation we can only deal with the conditions existing at the first row of blades and imagine that the conditions existing at any intermediate row of a particular expansion are somewhat similar.

To begin with, then, the diameter at the low-pressure end being nearly double that at the high-pressure end, and assuming heights proportional, it follows that the leakage area at the low-pressure end is three times that at the high-pressure end.

The same weight of steam flows through all three sections of the turbine, so that the ratio

$$\frac{\text{leakage steam}}{\text{working steam}}$$

will be greater (neglecting the change in density) for the same pressure drop per blade in the low pressure section than it is in the high-pressure section. To find the pressure drop per row in the two stages under consideration:—In any given row of blades let dQ be the heat liberated, ϕs the entropy of the steam there, and dT the fall in temperature, then we may write

$$dQ = \phi s \, dT \qquad (1)$$

At the entrance to the high-pressure section we take ϕs as the entropy of the dry steam there, but at the entrance to the low-pressure section ϕs becomes the entropy of steam after adiabatic expansion (for the purposes of calculation and neglecting friction). Putting in these values to suit pressures of 150 lbs./in.^{2} and 15 lbs./in.^{2} absolute we find the fall in temperature over the first row of blades in the high-pressure section is 0·95°F., whereas in the first row of the low-pressure section it is 3·21°F., the corresponding pressure differences being 1·76 lbs./in.^{2} in the high-pressure and 0·9 lbs./in.^{2} in the low-pressure section. The ratio of pressures at the entrance and exit edges of a single blade in the high-pressure section is found to be $\frac{14·42}{14·1}$ = 0·99, and in the low-pressure section $\frac{150}{15·0}$ = 0·94. The weight of steam leaking over the tips of the blades in lbs. per second per square foot of leakage area is given by the formula:—

$$W = \sqrt{\frac{2\,g\,n}{n-1}\,\frac{p_1}{v_1}\left[(R)^{\frac{2}{n}} - (R)^{\frac{n+1}{n}}\right]}$$

with sufficient accuracy in the case of the high-pressure section, but when dealing with the low-pressure section it gives too small a value on account of the wetness of the steam, the real discharge is equal to the calculated dry steam discharge plus the percentage of water in the steam. In the formula, n = the index for adiabatic expansion of dry steam; p_1 and v_1 the steam conditions at entrance, if dry. R = ratio of pressures on the two edges of the blade, g = acceleration due to gravity. Then W = 6·3 for the high-pressure section and 1·6 for the low-pressure section (allowing for the wetness of the steam) in lbs./sec. per sq. foot of leakage area, but since the area in the low-pressure section is three times as great as the high-pressure section.

Leakage steam in the high-pressure section ...	6·3	6·3	
			= 1·31
Leakage steam in the low-pressure section ...	3 × 1·6	4·8	

Suppose now that 1·3% of the steam entering the turbine leaks over the tips of the high-pressure blades and does no useful work, then we would expect only 1% of the steam to leak over the tips of the low-pressure blades. Considering only, for the moment, the dynamic effect of leakage the loss would be 1·3% of the heat available for work with adiabatic expansion and the efficiency of the high-pressure section (neglecting all other losses) would be 98·7%, whereas the efficiency of the low-pressure section would be 99%. In the case of 2,000 kilowatt turbine running at 1,500 revolutions per minute with a ratio of blade speed to steam speed of 0·3 at the first row of blades, the mean diameter of the blading at the entrance end would be about 16″ and the blade height approximately 2½″, so that with a clearance between the blade tips and the casing of $\frac{1}{32}$″ (measured hot) the leakage steam would amount approximately to 1·3% the working steam. Turning now to the thermodynamic effect of the leakage steam, we find that with the pressure differences calculated above, the difference in the total heat of the steam on the two edges of a high-pressure blade amounts to 0·28 B.Th.U., whereas in the case of a low-pressure blade it amounts to 0·90 B.Th.U. per lb., therefore the quantities of heat available for drying the working steam and increasing its entropy are in the ratio

$$\frac{\text{high pressure}}{\text{low pressure}} = \frac{1·3 \times 0·28}{1 \times 0·90} = 0·4$$

That is to say, the thermodynamic aspect of the effect of leakage shows it to be at least twice as great in the low pressure section as in the high pressure section. It is difficult to account for the prevailing impression that the high pressure blades of a reaction turbine are less efficient than the low pressure blades because every theoretical consideration leads to just the reverse conclusion. Take, for instance, the thermodynamic effect of steam friction in the blades themselves; if the steam remained dry throughout expansion the friction loss would be four times as great in the low-pressure section as it is in the high-pressure section, because the velocity of the steam through the blade openings is twice as great, and the friction loss is approximately proportional to the square of the steam speed. But in addition to this there is water present in the low-pressure section unless the steam was initially superheated, so that the co-efficient of friction must be very much higher on this account, as well as on account of the increase in steam speed.

DIMENSIONS OF SHIPS.

At the 18th general meeting of the Society of Naval Architects and Marine Engineers held recently in New York, Sir William White read a paper on "The Maximum Dimensions of Ships." He said this was one of the problems which popular notions, even among naval architects, had thrown somewhat out of focus. The question of large ships was one of these. While admitting the universal tendency toward larger sizes, the number of ships of extremely large dimensions was relatively small, and whatever might be the future growth in size of the largest ships built for special service, the bulk of the maritime business of the world would always be done by ships of relatively moderate dimensions. The construction of ships considerably larger than the present leviathans would involve no technical difficulties, the only obstacle being the building and operating costs, and the unwillingness of dock authorities to undertake the huge improvements necessary to accommodate the few monster vessels likely to come to them. For the moment, 40 feet of water at low tide seemed to be the maximum contemplated; and most ports were content with less, especially when there was a good rise of tide.

MARINE REFRIGERATION.

IN the last month's issue, the writer mentioned briefly the question of the survey and maintenance of marine refrigerating plant, and questioned the efficacy of the methods at present in use to ensure any vessel used to carry frozen produce being fit for that purpose and able to bring home a cargo in perfect condition, for the fact is known to those in the trade that the vast majority of frozen meat ships seldom succeed in delivering a cargo free from blemish of one kind or another. Of course the responsibility for this state of affairs may rest with the shipper of the meat, who fails to take precautions to ensure his cargo being shipped in a fully frozen condition and it is well known that at quite a large number of "frigorifico's" the arrangements for protecting the meat from the sun during transit from factory to ship are so primitive that the frozen stuff often reaches the ship's side in such a condition that the ship's officials take a grave responsibility in allowing it to be shipped, and the chilled produce sometimes looks as if it had never been chilled at all. Such a state of affairs should not be allowed to exist and shipowners could by united action bring pressure to bear which would reduce the underwriter's risk on this account to a minimum.

But it is not to this kind of case we refer, it is to the much more common one in which a cargo shipped under the best conditions turns out faulty through mould, brine stains, or slimmess, which faults can be traced directly to minor defects in the machinery or insulation of the vessel carrying the cargo.

These matters are seldom heard of in court because the financial stake is so small that the underwriters hesitate to go to the expense of a legal contest but the amount lost in such cases reaches an alarming figure in a year.

Equipment defects can be discovered and rectified if a sufficiently careful survey of the vessel is made each voyage but this survey cannot be made in the hour or so which is devoted to the task by the classification surveyors. I have no wish to impugn the competency of or care exercised by the surveyors but I do assert that the time at their disposal is not sufficient to permit them to make a thorough test and examination of the insulation and machinery of a large meat carrier. There are only a limited number of surveyors competent by training and experience to deal with refrigerating plant, and under present conditions they have far too much work to do to be able to do it efficiently. To make matters worse the classification societies accept no legal responsibility for the mistakes of their servants and their certificates are issued quite without prejudice so that the shipowner relying on such a certificate as a guarantee of his vessel's condition has no legal remedy against the societies should a mistake be made and some serious defect be overlooked. No defect, however insignificant, should be allowed to pass without rectification, in the case of a refrigerating plant; and the fact that in most cases, particularly in a chilled meat ship, a twelve-hours' breakdown is sufficient to destroy utterly a meat cargo, renders it absolutely necessary to guard against such a breakdown by taking every precaution possible.

The only satisfactory form of supervision is the employment of a fully qualified outside surveyor of standing and repute. Such a surveyor can and does devote time and skilled knowledge to his work, and will make a very thorough and careful examination of all parts of the plant; he will test the insulation thoroughly and will not be afraid to spend money where it is necessary being quite independent of his employer. In addition, the fact that he may be financially responsible for his mistakes, and that his business reputation depends on his care and ability, stimulates a lively sense of responsibility, and thus reduces the risk of error or carelessness to a minimum. That such a surveyor is the most efficient protection could be illustrated in many cases and it is unquestionable that much unsuspected trouble may exist and be unearthed by a careful and thorough examination.

In my article last month I unwittingly overlooked the fact that Messrs. Lamport and Holt had in years past owned several of the old cold air vessels. The cold air machine is of course hopelessly out of date today, but it is questionable whether the change of method of refrigeration has done anything to improve the quality of the frozen meat turned out. Its "coal eating" propensities and the enormous size of the machine itself have driven it out of the market but for some purposes the combination of cold air and one of the more efficient refrigerating agents such as CO_2 or ammonia known as the "Kelvin" system seems to hold its own even now.

The appearance on the market of another distance temperature recorder, which will no doubt be duly boomed and hailed as the last word, only to follow its predecessors into the limbo of failure, offers an excuse for the consideration of the subject as it affects the frozen meat trade.

The ordinary system of taking temperatures by means of thermometers let down from deck is open to many objections, and these while present in the case of frozen produce become greatly accentuated in the case of chill chambers where the margin of temperature variation permissible is very small and where half a degree has a very important significance. In the first place it is seldom possible to obtain a dozen thermometers which register the same reading in the same space at the same time. A casual glance at the thermometers in the box in the evaporator room of any frozen meat steamer and comparison of the readings with each other or with a standard thermometer, shows at once how much variation there may be in the readings even of the best class of thermometer. It is, however, possible to ascertain the error of each thermometer fairly accurately and by the use of an instrument by a high-class maker such as Heath & Co., to some extent minimise the danger of error. A more frequent source of error is the drawing of the thermometer up on deck often through uninsulated spaces where the temperature is high and into the open air in the hot tropical sun. This is bound to cause a variation and to make it practically impossible to ascertain the true temperature in any space.

To obviate these dangers and to lessen the labour involved distance recorders of divers kinds have been placed on the market from time to time but the cost is usually prohibitive and the nature of the contrivances renders them peculiarly liable to accident, and makes them often so unreliable that the cure may be worse than the disease.

Most of the devices consist of an electrical attachment to a thermometer, of special construction, placed in a fixed position in the space concerned and depend for their action on a variation of the resistance of the circuit due to a fall or rise of temperature, which is indicated in any convenient station by a properly graduated scale. In such cases special calibrating appliances are attached to permit verification. Unfortunately other considerations sometimes operate to vitiate the readings of such instruments and to make them unreliable and this fact together with the high cost of installation prevents their general adoption.

There can be no doubt that a reliable apparatus of this type at a moderate cost would be welcomed by refrigerating engineers and would command a good sale.

WIRELESS TELEGRAPHY. An interesting paper on the subject was read by Mr. John McFarlane before the Institute of Marine Engineers on December 12th.

MESSRS. HENRY PELS & CO. have been awarded by the Jury of the International Exhibition at Turin, the Grand Prix for their manufacturers: Punching, Shearing and Cropping Machines.

THE MACHINE TOOL AND ENGINEERING ASSOCIATION, LTD.—The annual meeting will be held on January 11th at the Midland Hotel, Manchester. This association is arranging The International Engineering and Machinery Exhibition to be held at Olympia in October.

THE THORNYCROFT MOTOR LAUNCH [illegible] built in 1907, has recently completed what is probably the longest non-stop cruise on record, a distance of [illegible] miles being covered in eighty seven hours. The journey was from Asuncion (Paraguay) to Buenos Ayres (Argentina).

THE Marquis of Graham [illegible] motor yacht *Maid* recently ran trials on the Firth of Clyde, when a speed of between [illegible] and [illegible] knots was attained. The *Maid* is [illegible] and is a fine example of the [illegible] yacht. She is from design by Messrs. Wm. Beardmore & Co. Dalmuir, and has been built under their supervision. The propelling machinery consists of one [illegible] Beardmore direct reversible engine. After the speed trials reversing trials were carried out. These showed the ease with which the [illegible] engine can be handled. The *Maid* is to be in commission throughout the winter and she will sail shortly on an extended cruise.

BIRKENHEAD DOCKS.

IN a previous article we dealt with the system of Dry and Wet Docks on the Birkenhead side of the Mersey owned by Messrs. Cammell, Laird and Co., Ltd. In this article we give a description of the section of docks on the Birkenhead side of the river, owned and worked by the Mersey Docks and Harbour Board. It may be of interest to note in passing, the origin of the Port of Liverpool and the early history of those docks on the Cheshire side. Originally a port existed in which small boats employed in the salt industry and fishing found anchorage. This port had its mouth in the vicinity of the present Customs House.

The port seems to have been first mentioned in the reign of Richard I. In 1207 King John granted letters patent making it a free borough, and settlers were invited to take up allotments. After this date it seems to have been well-known as a port in connection with trade with Ireland.

About the year 1600 the Port of Liverpool had outvied that of Chester, Conway and Beaumaris in the amount of customs dues, somewhere in the neighbourhood of £300, and about 1650 shipping was considered to be the chief trade of Liverpool.

In the reign of Queen Anne the Corporation decided to make the port safe, and in November, 1708, the same body decided to empower its Parliamentary representatives to arrange with an engineer, Thomas Steers, to prepare plans for the conversion of the port into the first wet dock in England. An act was passed to provide the money, and the dock was opened in 1715, and completed in 1720. About 1753 a second dock named the Salthouse Dock, and a pier at the old dock entrance were completed. In 1761 a third dock was constructed, and lighthouses were erected on both sides of the river, these properties and the power to collect dues being vested in a board consisting of the Mayor, Aldermen, Bailiffs and Common Council of Liverpool, under the name of the Trustees of the Docks and Harbour of Liverpool. After the American War of Independence, other docks were constructed, and Liverpool saw itself established as a great seaport.

With the growth and development of Birkenhead, two of its leading citizens, Mr. Wm. Laird and Mr. Tobin purchased land adjacent to the Wallasey Pool with the intention of constructing docks. Later the Liverpool Council also purchased land for a similar purpose, but this fell through. About 1844 a bill was passed empowering the Birkenhead Dock Company to convert the Wallasey Pool into docks, and for this purpose land was acquired adjacent to the pool. In 1848 this Company also purchased the Herculaneum Dock Estate on the Liverpool side; however, in 1855 the whole of the Birkenhead property was purchased by Liverpool for £1,143,000, and in 1857 the entire Birkenhead Dock Estate was transferred to the Mersey Docks and Harbour Board. The system of the Birkenhead Docks consists generally of two main locked entrances from the river, six wet docks, besides the East and West Floats, also three graving docks in the West Float. The Wallasey Dock was originally a low-water basin, but great trouble was experienced with the foundations, which were piled. This basin was completed in 1863, being opened by Admiral Dacres. Attempts were made to maintain a depth of 10 feet below low water by means of large sluices, this however, causing a great rush of water, constituted a danger to the shipping, and finally the basin was converted into the Wallasey Wet Dock.

The Northern entrances and Alfred Dock were opened by the Duke of Edinburgh in 1866. This dock was later much improved, sheds along the sides 60 ft. wide being erected, the total work on the dock costing somewhere about £350,000. The outer of these Northern entrances has locks of 480 ft., 398 ft. and 198 ft. in length respectively, with width of 99 ft. 6 in., 49 ft. 6 in. and 28 ft. 9 in. These entrances lead into the Alfred Dock from the river, which dock has a water area of over 8 acres and a length of quay of over 500 yards. The outer entrances have a depth of sill below datum of 18 ft. 3 in., 11 ft. 10 in. and 12 ft. respectively. These locked passages lead from this dock into the East Float, a large area of water nearly 60 acres in extent, having a lineal quayage of one mile 1,640 yards. This Float is used by several large lines chiefly trading to the East, and is fitted with one 11-ton and one 27-cwt. hydraulic cranes, which are used for loading and unloading. This float has also one fixed hydraulic coal hoist for waggons of 20 tons gross, also six hydraulic tips for loading flats.

Amongst Lines using this Float may be mentioned the China Mutual, City, Bibby, Hall, Anchor, Ellerman and Harrison Lines, also T. & J. Brocklebank, Ltd. A large amount of grain is also discharged here for the large flour mills adjoining. Passages exist from this float into the Wallasey, Vittoria,

Alfred Dock and Northern Entrances—Birkenhead Docks.

[illegible] Floor [illegible] Birkenhead Docks. Showing Floor Mills [illegible] Coal [illegible]

Egerton and Morpeth Docks and West Float. The Wallasey Dock has an area of nearly 13 acres and is used for grain and general traffic, and has a passage width of 49 ft. 3 in.

The Egerton is a general dock with an area of over [illegible] acres and a passage width of [illegible] ft. [illegible] in.

The Morpeth Dock has an acreage of 11 acres 2,404 yards, with a west passage 69 ft. 9 in. wide and an east lock to river [illegible] ft. wide and [illegible] ft. long. Here there are one 25-ton and two 25-cwt. hydraulic cranes fitted. The Clan Line are the principal users of this dock, loading for South Africa and India.

The Morpeth Branch Dock adjoins the Woodside lairage, has an area of over 4 acres, a passage 84 ft. [illegible] in. wide, with a sill depth below datum of 14 ft. This dock is used by the Mogul Line and other traders to South Africa, India, China and Japan.

The Vittoria Dock is 11 acres 467 yards in extent, and has a passage 100 ft. wide, and is used chiefly for the China and Indian trades.

The West Float is over 52 acres in extent and has a lineal [illegible] of about 2 miles. The coaling cranes consist of two fixed and one movable hydraulic hoist for coal waggons of from 20 to 22¼ tons gross, also one 27-cwt. hydraulic crane. There are also one 87-ton and one [illegible] ton steam crane, also two 27-cwt. hydraulic cranes and one 4-ton hand crane.

The graving docks in the west float are three in number, of the following particulars.

LIST OF GRAVING DOCKS.

Name and Position	Width of Entrances		Sill below Datum		Coping at Hollow Quoins above Datum	Length of Floor	Total Length of Floor
West Float	ft.	in	ft.	in.	ft.	ft.	ft
No. 1 (East)	[illegible]	[illegible]	4	[illegible]	25	[illegible]	
No. 2 (Middle)	48	6	7	[illegible]	25	750	
No. 3 (West) -	[illegible]	3	[illegible]	[illegible]	25	[illegible]	2430

Total length of floor of the Birkenhead Graving Docks, 2430 ft.

*The Birkenhead Graving Docks share the benefit of the impounding of the Great Float and in consideration [illegible] Water on their Sills it may be assumed that the Water Level [illegible] less than [illegible] feet above Old [illegible] Sill.

Upon land situated between the Alfred and Wallasey docks the Wallasey lairage exists, while the land between the Wallasey and Morpeth docks is used as goods yards by the London and North Western and Great Western Railway Companies, on the river side of which is the Wallasey landing stage 600 ft. long by 70 ft. wide, provided with three bridges and platforms on piers. Immediately south of those docks is the Woodside lairage and stage, which latter is 800 ft. by 80 ft. wide, which has two bridges to shore, besides a floating bridge 678 ft. long by [illegible] ft. wide.

[illegible] Floor [illegible] Birkenhead Docks. [illegible]

The Birkenhead Docks are worked on the impounded system, or, in other words, water in the inner docks is maintained at about the high-water level of high spring tides. The Alfred and Morpeth Docks are used as locks for vessels entering or leaving the docks. The water lost through locking, sluicing and leakage is made good by powerful pumps erected at the east end of the Wallasey Dock, in close proximity to the river wall. The water is pumped direct from the river and discharged into the Wallasey Dock, and thence flows into the east and west floats. The installation consists of four centrifugal pumps 54 ins. diameter, three of which are driven by direct-acting compound engines, while the fourth engine is of the triple-expansion type, the steam being generated by five Lancashire boilers, 30 ft. long and 7 ft. 6 in. diameter. The pumps combined deliver 257,000 gallons per minute, through an average lift of about 10 ft. The work of the pumps varies considerably; for instance, on a high spring tide there is very little for the pumps to do, except to make good the ordinary leakage, but as the tides recede the work increases proportionately, the maximum being, of course, on low neap tides. Another feature of interest is the Birkenhead Foreign Animals Wharf, which is in two sections, one located at Woodside and the other on the north side of the Wallasey Dock, occupying areas of 7½ and 13 acres respectively. These areas are connected by runways, so that cattle can be moved from one to the other as required. The cattle are disembarked from the vessels which convey them to the port at the Woodside and Wallasey floating landing stages, of which 300 ft. of the former and 500 ft. of the latter is available as a cattle landing berth. Each of the sections referred to is laid out with lairages in which the cattle are received and kept until the time comes for them to be slaughtered, which must be within ten days from the date of their arrival, with slaughterhouses, close to which are rooms in which the carcases are hung for cooling by ordinary exposure to air, and with special refrigerating rooms in which the meat is exposed to an atmosphere approaching freezing point, previous to being despatched to the different markets of the country. In the Woodside section the older cattle lairs consist of single storey buildings, but as the trade expanded additions had to be made and the block of warehouses known as Morpeth Warehouses, consisting of the basement, ground and three upper floors, was added and fitted up for the reception of cattle. The ground floor has been laid out as a slaughterhouse, with cooling rooms; the upper floors are fitted out as lairages, the cattle reaching them on their arrival by walking up an incline from the ground level on the south side, and being brought down the same way to be slaughtered. In the Wallasey section the latest addition is a two-storey lairage provided with a spiral incline for cattle. This building has been designed so that additional floors can be added at any time. A covered meat market is also provided where meat is displayed for inspection by buyers. Provision is also made for subsidiary processes in connection with the disposal of blood, and offal, rop and fat houses are provided outside the lairage enclosure at the north-east corner. The lairages have a capacity for over 6,000 cattle and 16,000 sheep, with cooling rooms or meat stores to hold 3,188 carcases, and chill room accommodation for 3,385 carcases. The transfer of carcases from point to point within the lairages is effected by overhead meat rails, each half-carcase being hung from its pulley so that it can be easily run from place to place and switched into or out of any room as may be necessary. Convenient sidings are provided in the lairages to facilitate the loading of meat into vans to be conveyed to different parts of the country. These sidings are connected with all the principal railway systems.

A very large coal business is carried on at the Birkenhead Docks, principally in North Wales coal. To deal with this three fixed and one movable hoist for coaling ocean-going vessels, also six hydraulic tips for coaling barges and small craft are provided. The movable coal hoist can be moved along the quay for a length of 310 feet. It stands 75 feet high, and is 40 feet wide, with a gross lifting power of 22¼ tons to a height of 41½ feet above quay level. The speed at which coal can be shipped at this hoist depends of course on the arrangement of trimming of the coal in the holds, but with suitable steamers a very rapid rate can be attained. As much as 227 tons have been shipped in 40 minutes, or at the rate of 340 tons per hour. Two of the fixed hoists have a lift of 51 feet from the quay level, and can deal with wagons of 22¼ and 20 tons gross respectively. The third fixed hoist can deal with gross lifts of 20 tons at a height of 21¾ feet above quay.

Another feature of the coaling arrangements is that of the jetty erected some years ago for Messrs. R. and J. H. Rea. It is equipped with four portable hydraulic cranes of five tons power each. These cranes are used for passing bunker coal from the South Wales colliers lying on one side of the jetty to flats or lighters lying on the other. Vessels of the latter class are largely used on the Mersey for conveying coal from the hoists, tips or cranes to the ocean-going steamers which cannot go to the appliances without loss of valuable time. For dealing with heavy lifts an 87-ton steam crane is provided on the east side of Gilbrook Basin. This crane has a reach of 44 ft. 6 ins. from the coping line of the dock, and a total range of lift of 72 feet above the quay level.

For power purposes in working dock gates, capstans, bridges, coaling appliances, warehouses, etc., two large hydraulic installations are provided, one near the entrance of the Wallasey Dock on the east side of the East Float, and the other on the south side of Duke Street Passage, about midway of the docks, which serve a very complete system of hydraulic pressure and return mains.

Forty or fifty years ago Birkenhead's rise from hamlet to the city of the future was phenomenal. Its geographical position on one of the finest waterways of the world and on the north-east corner of the Wirral peninsular certainly gave promise of the fulfilment of the dream of its promoters. Where the ships are and where raw material is handled there is trade and in the days of the promotion of Birkenhead's Docks, etc., this seems to have been realized. Perhaps its close proximity to its successful sister city, combined with the delay in transport to the Lancashire side, has helped to conduce to the greater success that is, of course, to be noted in the greater system on the northern shore.

Birkenhead, it will be remembered, was the pioneer

in the electric tramway system and a glance at its wide streets, its squares and its parks point to the sagacity of its pioneers.

The dock system has about one-third of the total quay space of the port, this space being mainly used for grain, cattle and coal.

It has been suggested that train ferries would be a great benefit to the latter trade, since Lancashire coal is shut out of Birkenhead and North Wales coal is prevented from reaching Liverpool through its most natural source. About eighty such train ferries are in operation in the States, some under very similar conditions.

One branch of industry has done wonders, due to a little kindly fostering, *viz.*, the flour milling trade. A differential rate being allowed on all grain entering the great float. Huge flour mills have been erected by Messrs. Buchanan, Vernon Bros. & Paul Bros. These mills are amongst the finest in the world and they have captured trade that previously was done in America.

Amongst the many engineering and shipbuilding firms adjacent to the docks may be mentioned Messrs. W. Dickinson & Sons, whose works are in Cathcart Street, where all classes of steam launches, yachts, etc., besides general work, are carried on.

Messrs. A. Rutherford & Co. also carry on an extensive business at their Neptune Works, as ship repairers, engineers and boiler makers. They have contracted to the British and Foreign Admiralties, the Royal National Lifeboat Institution, etc. A fire recently destroyed the main shop, but this has been rebuilt and fitted up in the most up-to-date manner, enabling them to meet all demands of their clients.

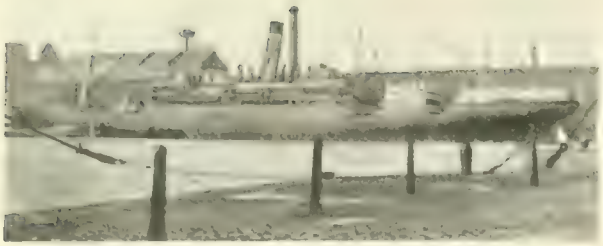
Coal Hoist, West Float.

Tower Building, Wallasey Dock, Birkenhead.

Messrs. J. Gordon, Alison & Co. have a well-equipped establishment, comprising repairs yard, large foundry, machine shop with extensive offices, where a large range of work is carried on. Two cupolas are used for reducing scrap, from one of which castings can be produced in three hours, a valuable asset for repair work. Heavy steam hammers, electric cranes, shapers, plate rolls, etc., are installed, the works having been established in 1875 and extended in 1899, and now give employment to about 600 men. An oil tank barge was recently built by this firm for the Anglo-American Oil Company, three separate tanks for oil being built as separate structures to the hull, which was 70 ft. long by 15 ft. beam and 7 ft. deep, to suit the requirements of the Dock Board. This firm makes a special duplex pump.. Besides, coal-hoisting towers, special coal grabs, abattoir fittings, ash hoist and warping engines.

Messrs. Clover & Clayton have extensive ship and engine repair works south of the Woodside Ferry, where they have graving docks and yard for the expeditious carrying out of general contracts.

Messrs. Grayson, Ltd., who have recently amalgamated with the above firm, have also extensive works, opened in 1904, in Beaufort Road, directly opposite the Mersey Dock and Harbour Board's Graving Docks West Float, Birkenhead, and within three minutes of Birkenhead Docks Station on the Wirral Railway, by which route it is possible to reach Liverpool, James Street or Central Station, in fifteen minutes. There is also a frequent service of electric cars from Woodside Ferry and Hamilton Square (Mersey Railway) to the works. At the works entrance in Beaufort Road are situated the



Bibby Liner *Hartlebury* in West Float.

general offices, and above these are the managers', drawing and accountants' offices.

Immediately behind the offices and entrance are the fitting and machine shops, which are equipped with lathes of the most efficient and latest types, of various sizes, together with planing, boring and universal milling machines and drilling machines. In the centre of the shop is a large surface and marking off table, jib cranes fitted with chain blocks, capable of lifting heavy weights, are placed in positions suitable for handling jobs in and out of the various machines as required. The machinery in this shop is motor driven. These shops also contain the plumbers' and coppersmiths' benches, with the necessary fires and screwing machines.

Adjacent to the machine shop is the power house, where all current for driving the machinery and lighting purposes is generated, the plant consisting of a Crossley engine and multiple dynamo and a Crossley engine and dynamo, also a motor generator reducing the current from the town mains to that of the works, the gas for driving the engines being produced on the premises by means of a patent gas producer.

The remainder of the main building is occupied by the plating, boiler-making and blacksmiths' shops. There is erected here machinery of the most efficient type, being electrically driven, capable of dealing with the largest and heaviest of vessels, shell plates, frames, beams and boiler plates, and consisting of large rolls, planing machine, shearing and punching presses, double-headed countersinking machine, radial drilling machine and horizontal beam bending and punching machine, also a large furnace for heating plates and frames prior to flanging and bending, and immediately facing this are the large levelling blocks. In this shop there are also the blacksmiths' and ironworkers' forges, the blast of which is supplied by a fan, motor-driven. Conveniently situated alongside the blacksmiths' fires is a large power hammer driven by compressed air; also a smaller one for tool making. Connecting pipes are laid the full length of the shop, from the compressor for the working of the pneumatic hammers and drilling machines.

Adjoining the works is a large store yard; here are the iron and plate racks and riggers' stores. At the back of this yard, overlooking the railway, is the general stores of the works. Running right through the stores, yard and works are metals on which travels a large crane.

Alongside the West Float Graving Docks, opposite, Messrs. Grayson, Ltd. have placed a portable boiler with engine, driving two air compressors, pipes being laid along the side of the graving docks for supplying the necessary power to pneumatic tools in use on vessels undergoing repairs in dry docks.

The advantages of being provided with a private railway siding and being adjacent to the docks, decided the F. E. Adams Pressure Tool Co., Ltd., to erect new works opposite the Great Float. Although not directly interested in the shipping industry, The F. E. Adams Pressure Tool Co. are makers of machinery for pressing, drawing and cutting a large variety of metal articles, a number of which are used in ship construction. They are also the leading English makers of automatic machinery for the manufacture of tin boxes and canisters for the packing of goods, oils, petrol, etc., etc. Their manager, Mr. Melville G. Clayton, was formerly employed by Messrs. Cammell, Laird & Co., Ltd., in a responsible position.

One of the distinctive features of the Mersey Docks and shipping are the coaling barges owned and worked by The Liverpool Barge and Coaling Co. The system consists of a large set of bunkers at Monk's Ferry, Birkenhead, capable of storing 5,000 tons. Coal trucks are hauled up an incline, after which the coal is dumped into the bins. It then gravitates into the Company's barges, being mixed during this operation. An expert chemist is employed for testing the coals, whilst a marine boiler is also installed for the same purpose. A second plant, with wet dock and sidings connected to the main line between Liverpool and Manchester, is now being constructed. The trucks of coal here are run up a natural incline, after which the coal gravitates into the barges or vessels. This plant is situated half-way between the Liverpool and Garston Docks, at Otterspool. The bins will have a capacity of 7,000 tons. The wet dock will be 400 ft. long and 128 ft. wide, with a draught of 56 ft. and 20 ft. at high and low tides respectively. The patent coaling barges can coal a vessel in dock or in the river, and whereas with ordinary methods from twelve to twenty-four hours was needed to load 1,200 tons, this is done by the new system in the same number of minutes, the coal being also mixed while discharging from the barges. Each barge can load 150 tons per hour, and the advantages claimed, besides speed, are economy, cleanliness, no

S.S. *City of New York* in No. 3 Graving Dock, West Float.

loss overboard, and coaling of ship in any position. Almost all the large Lines use these barges, which are to be found also at Southampton, Plymouth, London, etc. This system is the invention of Mr. Clarke, and in these days of "quick turn rounds" this system must have a great future before it, and will save shipowners thousands of pounds in the vital operation of quick and efficient coaling.

The Barge Crane *Samson*, owned by the Mersey Docks and Harbour Board, which, with the *Hercules*, serve the Docks on both sides of the river.

MARINE OIL ENGINES OR TURBINES: A COMPARISON.

A RECENT announcement in the various papers, to the effect that a torpedo boat destroyer, presumably of some 20,000 shaft horse power, is now building, and is to be fitted with a combination of steam turbines and reciprocating oil engines of the Diesel type, marks what is decidedly a new stage in the development of the marine engine for high-speed work.

The steam turbine and the heavy oil engine are progressing together, and each has been developing on its own lines for a not very different length of time. Undoubtedly the turbine has supplanted the reciprocating steam engine for high-speed work, and it is quite possible that in the near future its sphere of utility will be extended to even the slow-going tramp steamers.

The two predominant questions which are now arising are:

(1) Can the development of the Diesel marine engine proceed to such an extent as to supplant the turbine in its present premier position for large and high-powered installations—*e.g.*, liners and warships?

(2) Can it (starting, as it does, on practically equal terms) outstrip the turbine in the race for popularity in the future problem of the propulsion of merchant vessels?

Ten years ago the marine reciprocating steam engine had passed through such stages of evolution as to be regarded, to all appearances, as nearly as perfect a piece of mechanism as was possible to produce. With the exception of details, the chief strides seem to have been made in its infancy. The rise of pressure from slightly above the atmosphere to 200 lbs. per square inch, and sometimes even higher, and consequent on this the recognition of the higher efficiency to be gained by utilising to a higher degree the expansive property of the steam in the compound and triple-expansion engines, all took place within a comparatively short space of time. Concurrently with this development was the natural and necessary evolution of the boiler, from the old, flat-sided iron boxes of the "atmospheric" period to the modern cylindrical boiler, and, last of all, to that marvel of lightness and strength, the water-tube boiler.

During the last ten or fifteen years the development

of the water tube boiler has been accompanied by the surprising and extraordinary evolution of the turbine, and as far back as 1904 it was easily seen that, as far as high speeds were concerned, the reciprocating engine was doomed.

A few of the reasons of the success of the turbine may be noted for purposes of comparison:—(I.) Its extreme simplicity and the absence of working parts. (II.) It deals with steam at a far lower pressure than is possible in a "steam engine." (III). There is a considerable economy at high speeds. (IV.) Its lightness and the comparatively small space occupied. (V.) The initial pressure is comparatively low (170 lbs. per square inch). (VI.) Smaller staff required than for an equally powerful set of reciprocating engines. (VII.) Absence of vibration, and the presence of water is not likely to have such an injurious effect as is the case in an ordinary steam cylinder.

There are, of course, against this, certain disadvantages, the chief of which are:—(*a*) Loss of economy at low powers and the consequent introduction of cruising turbines. (*b*) Inability to go "astern" and the consequent introduction of separate astern turbines. (*c*) The necessity for a considerable increase in the capacities of various auxiliary engines to obtain the necessary high vacua. (*d*) With direct-coupled turbines and propellers the propeller speed is too high, and the turbine speed too low, for each to be working in the most efficient way.

An observation of an Entropy diagram of a set of reciprocating engines reveals the fact that the high-pressure cylinder is very efficient, whilst, owing to the limited expansion, the efficiency of the low-pressure cylinder shows a lamentable falling-off.

On the other hand, owing to short blade heights and comparatively large leakage past the blade tips, a turbine somewhat lacks in efficiency at the high-pressure end, but on account of the very complete expansion of the steam, the low-pressure turbine is extremely economical.

Some distinct advantage may therefore be obtained in the matter of economy by using a high-pressure reciprocating engine in conjunction with a low-pressure turbine. This method has been employed with success in several cases.

Realizing the importance of improving the performance of the H.P. end of the reaction turbine, Parsons has now introduced an impulse stage, instead of the first reaction stage, with the advantage that a considerable drop of pressure takes place in the nozzles, followed by constant pressure through the stage of impulse blading, with little, or no tip leakage. This also enables the Parsons turbine to cope with the coming demand for a moderate superheat.

In addition to this, an inspection of patent specifications will show that the "impulse" turbine, of which the "Curtis" is perhaps the best example, is undergoing considerable modification. In this turbine the last, or low-pressure nozzle stages have been done away with and a "drum" stage substituted. It is claimed that this "drum" stage is still a series of impulse stages, the fixed blades acting as nozzles. This is, however, doubtful, and it is quite possible that under the somewhat problematical condition of the low-pressure steam, the action is similar to that in a reaction turbine.

Thus with the Parsons turbine modifying its H.P. end to the "Curtis" form, and the Curtis turbine modifying its L.P. end to the "Parsons" form, it seems to point that in the near future the two types will merge and produce a "standard" marine turbine, the H.P. being of the "impulse" and the L.P. being of the reaction type.

Looking ahead, we will assume such a "standard" turbine fitted in a large ship such as a liner or battleship. Can such an installation be beaten by an "oil engine?" As regards economy "Yes," but as a practical fitting "No," and for the same reason that such vessels still burn coal. There is not enough oil fuel available.

Now turn to small, fast-running craft, which can burn oil fuel alone. It is more difficult to give a direct answer, owing to the greater thermal efficiency of the Diesel engine. Still, no *simpler* or more easily managed instalment can at present be imagined than one consisting of a set of "standard" turbines supplied with steam from oil-fired boilers. The question of auxiliaries is also of paramount importance.

However, in both the above cases—*i.e.*, the large ship burning coal and oil, and the small ship burning oil alone—the introduction of an oil engine to the propelling machinery appears to have considerable advantages, especially in the matter of "astern" working, and the development of steam generation for low-pressure turbines, by means of the exhaust gases, would be watched with interest.

Coming now to the merchant class of steamer, having few auxiliaries, here the oil engine should have an exceptionally profitable field to work, as all the elements for success are present with the exception of cost of fuel. These elements are:—

(1) High thermal efficiency.
(2) The question of weight is not of great importance.
(3) Greater radius of action or increased cargo capacity.
(4) We have an engine running at a low speed of revolution, thus securing both an engine and a propeller, each running at a speed conducive to high efficiency, without the obvious disadvantages of intermediate gearing, whether spur gearing, hydraulic or electrical. In such a ship the steam necessary for the production of fresh water, etc., could quite easily be generated by the waste heat in the exhaust.

In conclusion, it is perhaps unnecessary to add that *the* mechanism to which all engineers are looking forward, but which seems still in the far distance, is the gas or oil turbine.

BOARD OF TRADE REGULATIONS RELATING TO THE EXAMINATION OF ENGINEERS IN THE MERCANTILE MARINE. The Board of Trade have recently issued a new edition of these regulations, showing the points on which the regulations differ from those contained in the previous (1908) edition.

STEAM BOILERS. The annual report of H.M. Chief Inspector of Factories has just been issued and affords extremely useful information for the guidance of those left in charge of boilers, etc. There is some very valuable reading contained in the report, which deals with the causes and prevention of explosions and accidents, the dangers peculiar to boiler mountings and to other appliances such as economisers, superheaters, etc. The subjects are carefully gone into and quite a large number of illustrations are given. The report may be obtained through the usual sources at 1/3 per copy by post 1/5½.

MERSEY DOCK ESTATE
PLAN OF BIRKENHEAD DOCKS

NAVAL MATTERS—PAST AND PROSPECTIVE.

Portsmouth Dockyard.

THE [illegible] is being prepared for commissioning [illegible] On December [illegible]th an explosion occurred in the vessel eighteen officers and men were injured, [illegible] of whom were sent to Haslar Hospital. The accident occurred to the oil bath in the forward dynamo room while electrical tests were being made. It is stated that in some way the bearings became overheated and the gas generated caused the drum to burst. The vapour became ignited and the whole compartment was instantly in flames. Another explanation is that an electric spark was emitted and this ignited the vapour. The battleship [illegible] is making good progress. It is understood that the order for the engines of the battleship which is shortly to be laid down will be placed with Messrs. Cammell, Laird & Co. The battleships [illegible] and [illegible] of the First and Second Divisions of the Home Fleet are undergoing their annual refit, which will in neither case be very extensive. The cruiser [illegible] on whose refit over [illegible] has been spent, has been commissioned and has left for the Australian Station. The repairs to the cruiser *Hawke* will be completed by the end of January. Nearly a right new stem has been built up and the underwater ram dispensed with. His Majesty's yachts the [illegible] and [illegible] and the *Victoria* are to have their refits completed by February 17th and January 15th respectively. The cruiser *Aboukir* has arrived from the Mediterranean and has been placed in the Fourth Division of the Home Fleet preparatory, it is understood, to being turned over to the Royal Canadian Navy. The *Kent* was ordered to take the place of the *Aboukir*, but at the last moment the order was cancelled and the *Hampshire* took off for the duty. The latter cruiser left for Malta on December 6th. The torpedo gunboat *Sparker* has arrived for the repair of damage sustained in collision with an Austrian steamer in the Thames Estuary. An interesting ceremony took place on December 1st, when the battleship *New Zealand*, flagship of Rear Admiral Moggridge, commanding the local division of the Home Fleet, was renamed *Zealandia*. This was owing to the fact that the name *New Zealand* has been given to the battle-cruiser presented to the Empire by the Dominion. The renaming ceremony was performed by Lady Hall-Jones, the wife of the High Commissioner. The Commander-in-Chief, with a number of other officers of the port and representatives of the Dominion were present. Subsequently the company was entertained at luncheon by the Rear-admiral. Under convoy of the gunboat *Hazard* Submarine *D4* recently arrived. She is the first submarine to be fitted with a gun, which is mounted in a hatchway in front of the conning tower. By means of hydraulic machinery the gun can be raised through the hatchway and brought to the firing position when the vessel is on the surface. Some satisfactory tests have been made and further tests are to be carried out shortly. The Lords of the Admiralty came here on December 11th to complete their inspection which was postponed from November. The party included Admiral Sir Francis Bridgeman and Vice-Admiral Prince Louis of Battenberg, the new First and Second Sea Lords.

Devonport Dockyard.

[illegible] trials of the new battle cruiser *Lion* are to commence on December 30th. The eight hours' full-power trial, which is being anticipated with considerable interest in view of the vessel's abnormal horse-power, will take place on January 8th and the gun and torpedo trials on the 17th. On the satisfactory completion of her trials the vessel will be prepared for service in the Home Fleet. Work on the battleship *Centurion* is progressing favourably. The consignment of water-tube boilers received from the contractors, Messrs. Hawthorn, Leslie & Co., has been lifted on board and the ship will shortly be placed in No. 8 Dock to receive her armour. The plans of the *Centurion's* successor were received last month. Preparations are being made for commencing the ship and the laying down will take place during January. The contract for the construction of the propelling machinery and boilers has been placed with Messrs. Hawthorn Leslie and Co. Nothing is known as to the name of the new vessel. The name *Marlborough* has been suggested as a compliment to the new First Lord. The name disappeared from the "Navy List" some years ago. We have a large amount of refitting work the vessels in hand including the battleship *Bellerophon*, the cruisers *Bristol*, *Cornwall*, *Devonshire*, *Dartmouth*, *Gloucester*, *Iris* and *Sutlej*, half a dozen destroyers and four submarines of the "A" class. The *Bellerophon* is having a periodical refit of her equipment and an examination of the shafting, propellers and underwater fittings. The repair of the damage to the *Cornwall* when she stranded in Canadian waters while rendering assistance to the *Niobe* is to be made good by January 7th in order that the vessel may be able to proceed on her cruise the following week. The work is being continued day and night. The destroyer *Hind*, which arrived on November 30th from the works of Messrs. John Brown & Co., Clydebank, after being handed over to the Admiralty at the completion of a satisfactory acceptance trial, has developed machinery defects, and she will be detained for a week or two. The submarines are exchanging their secondary electrical battery installations and preparing for a long periodical refit. The battleship *Thunderer* will not arrive from the Thames for docking until January 21st, nearly a month later than at first announced. An air compressing house is to be erected at the new smithery at the North Yard, and the contract for the building and machinery has been given to Messrs. John Lysaght & Co., Bristol. The shop, which will be fitted up on the most modern principles, is to be completed by March. Captain De Robeck, having been promoted to flag rank, on December 21st unexpectedly relinquished the post of inspecting captain of boys' training ships establishments, only having held the appointment for ten months. His successor is Captain Pears from the battleship *Agamemnon*.

Chatham Dockyard.

It has been announced that the cruiser *Chatham* is to be ready for hoisting the pennant in August next, which will be a little over eighteen months from the time she was laid down. She could, of course, be completed by an earlier date, if necessary. The question of making a presentation to the vessel by the townspeople is under consideration. There is no doubt that the Mayor (Alderman Billinghurst) will interest himself in the matter, as he was employed in the yard for seventeen years before he left to go into business. It is understood that next year another vessel will be laid down here. We naturally should like to see a larger cruiser than the *Chatham* allocated to the yard, for a much larger vessel could easily be constructed on No. 8 slip. The battle-cruiser (this is the official designation of the armoured cruisers of the "Invincible" type) *Indomitable* has arrived and is expected to remain for several months. Very little has been done to the vessel since she was first commissioned and it is anticipated that her refit will be somewhat extensive. She has been placed in the new dock, which is the only one we have capable of taking a ship of her size. The battleship *Commonwealth*, of the Nore Division of the Home Fleet, has also come in for a refit. The battleship *Lord Nelson* has completed refitting and gone to Portland to resume duties in the Second Battle Squadron. The cruiser *Hyacinth*, which has undergone an extensive refit, is to be commissioned for service in the Nore Division of the Home Fleet in relief of the *Juno*. The cruiser *Scylla*, which was paid off a few months ago from service on the North America and West Indies Station, is shortly to be sent to Haulbowline for a refit. Another cruiser, the *Brilliant*, has returned from the same station and paid off in readiness for refitting. The cruiser *Blanche*, after having made good the damage she received when striking a submerged rock near Scapa Flow and undergoing her annual refit, has left to rejoin the broad pennant of Commodore Sir R. Arbuthnot, commanding the First Destroyer Flotilla. The destroyer *Scorpion* has come in for the repair of damage sustained in a collision with a sailing ship having been holed on the starboard side abaft the after funnel. The refits of the destroyers *Amazon* and *Tartar*, of the First Flotilla, have been completed, and the destroyer *Rother* has proceeded to Haulbowline for her boilers to be retubed, while another destroyer, the *Snapper*, has been berthed pending sale. The berthing of the Third Destroyer Flotilla at Harwich instead of at this port is regretted locally as the tradesmen will naturally suffer.

MENAI LIGHTHOUSE.

THE Menai Straits, the irregular streak of water which divides the County of Carnarvon from the Island of Anglesey, is full of interest to engineers apart from the pleasure derived from a visit to the neighbourhood and to the scenery within easy access. The Suspension Bridge (designed by Telford) which excites both admiration and interest, is 650 feet long on the roadway and this is 100 feet above the water-line. There are two carriage drives about twelve feet wide and a four feet pathway. The recesses cut in the rock for anchoring the suspending chains are well worth inspecting. The bridge, which cost about £246,600, was opened in 1826. The Britannnia Tubular Bridge (designed by Stephenson) was built in order to connect the railway extension to Holyhead and thus to facilitate the traffic with Ireland. The bridge was commenced in 1846 and completed in 1849. There are two tubes, each 1,510 feet long by 20 to 30 feet high by 14 feet 8 inches broad, and at either end are two couchant lions in Anglesey marble, 25 feet 6 inches long by 12 feet 8 inches high. The cost was about £602,000. The northern end of the Strait opens out into Beaumaris Bay, with its great sand banks stretching from Aber and Penmaenmawr across towards Beaumaris, leaving at ebb-tide a narrow water channel. Beaumaris, with its ancient castle and Baron Hill grounds, affords many delights to the visitor, as also does the neighbourhood between it and Penmon, where there are interesting momentoes of the past in the Priory (dating from 1221), its wishing well, dovecote, orchard, walnut trees and other surroundings. The quarry of Anglesey marble, which contributed to the building of the bridges, is near here, and in the bay adjoining the coast line is the Dutchman's Bank where the *Rothesay Castle* was wrecked in August, 1831, with a loss of 130 lives, on a voyage from Liverpool to North Wales. Leaving port under apparently favourable auspices with 150 passengers, the vessel proceeded on her course, but after getting clear of the river contrary winds and current were experienced and little headway was made; the weather off Great Orme's Head, became worse, a gale of wind and a high sea were encountered, drenching the stokehold and opening up the seams of the vessel (she was built in 1816). During the night she struck the bank and broke up. Twenty were saved by clinging to portions of the wreck and rescued by means of the Beaumaris lifeboat off the extreme easterly point of Anglesey. Close to the Dutchman's bank stands Puffin Island, so named on account of the legions of sea-birds upon it; between this Island and Anglesey is a deep channel of water about three-quarters of a mile wide. After the wreck of the *Rothesay Castle* it was determined to erect the lighthouse on Trwyn Du point, as shown in the illustration. It was built and established in 1837, then altered to its present arrangement in 1906. The Lighthouse is 96 feet high, and shows a group-occulting white light of 15,000 candle power, occulting twice every 15 seconds, as follows: Light 7½ seconds, eclipse 2½ seconds, light 2½ seconds, eclipse 2½ seconds. The light is visible in clear weather for thirteen miles. The fog signal is a bell which is struck sharply three times every 15 seconds, the mechanism actuated by clockwork. The building, which is a white circular castellated tower with three black bands, is founded on a rock, and can be reached from Anglesey by means of a built pathway, which, however, is only available at ebb tide, being covered at high water. Besides the lighthouse and signal station, connected by telegraph, there is a pilot and lifeboat station, ready to give effect to emergency instructions or appeals for help as they arise from time to time, and on such readiness and humane attention all round the coast lines our seafarers have learned to depend, knowing of the reliability of the lights to guide them and of the willing arms to help them in time of trouble.

The Menai Lighthouse on Trywn Du Point. [illegible]

FOREIGN NOTES.

Russia.

A COMPANY has been formed at St. Petersburg with a share capital of [illegible] roubles for the purpose of building ships, grain elevators, piers and other port requirements. Docks are also to form part of their enterprise and two dry docks are to be commenced very shortly in the Azov and Black Seas.

Austria.

The s.s. *Abbazia*, a cargo and passenger boat built to the order of the Austrian Lloyd has been launched and is to be completed quickly in order that she may enter on her services. Her speed will be 13 knots.

Holland.

The shipyard, Wortelboer & Co., near Hamburg, has booked many orders and has such excellent prospects that it has acquired two neighbouring properties for the purpose of extending its present establishment.

The *Van Gogh* built to the order of the Packetvaart Maatschappi, has been successfully launched by the Nederlandsche shipyard. Her speed is to be 13 knots.

Roumania.

It is proposed to build eight torpedo destroyers and eight submarines to guard more effectively the mouth of the Danube.

France.

A gunboat for the Ottoman Government, named *Issa-Reis*, its speed to be 14 knots, has been launched by the Chantiers de la Mediterranee.

The shipyard La Seine has recently launched the cargo and passenger steamer *Medie*. Her displacement is 8,210 tons. She will have a speed of 14 knots, and is intended for service in the Black Sea.

The cargo steamer *L'Afrique* has been launched by the Chantiers de France to the order of the Compagnie du Nord.

The destroyer *Bouclier* has just been handed over to the French Admiralty by her builders after successfully completing her trial runs. Her speed on her trials was 35.32 knots on a six hours' run, at a displacement of 660 tons.

La Compagnie Asiatique of Paris, carrying on shipping operations at Shanghai, has just disposed of its three steamers to the China Navigation Co., Ltd., of Shanghai. Those steamers, named *Li-Maa*, *Li Fang*, and *Li-Ta*, kept up a passenger and cargo service on the Chinese coast and also in the rivers, for which purpose they were constructed with flat bottoms. Their home port was Dunkerque. The Chantiers de France built the vessels in 1905 and 1906 in accordance with the most modern requirements. They were respectively 1,700, 1,700 and 2,900 gross tonnage and were equipped with engines of 1,900 to 2,100 h.p.

Germany.

A new firm of importance has been founded at Bremen and will be known under the name of Atlas Works, Ltd., for the purpose of taking over the Norddeutsche Maschinenfabrik, which was established some ten years ago. The directorate has some very influential names, *viz.*, F. Achelis, President of the North German Lloyd, Julius Thomson, director of the Hamburg-America Line, and others.

The German Petroleum Company has placed an order with the Osterholz shipyard for a twin-screw tank steamer of steel, of a dead-weight capacity of 4,000 tons. Two crude oil motors will be fitted and a fuel oil tank will be constructed reaching across the vessel and up to the main deck. There will be ten oil-tight compartments for the oil cargo. The oil pumps can each deliver 3,600 tons daily.

The *Cap Finisterre*, mentioned by us in a former issue, has now gone through its trial runs and attained a speed of 16·5 to 17 knots. Her engines developed 11,500 h.p., exceeding in speed and I.H.P. developed the contract stipulations. The steamer is being rapidly completed and is to take up its Atlantic service as soon as possible.

The new s.s. *Fufidji* has recently undergone her trials and achieved a speed of 12 knots. Her dimensions are: Length, 132·3 m.; greatest beam, 16·64 m.; depth, 9·4; and her displacement is 9,000 tons on a draught of 7·72 m. There is ample accommodation for the crew with separated spaces for the coloured crew as the *Rufidji* is to be employed on the East Africa line. The entire equipment of the *Rufidji* is specially adapted for service in the tropics, a refrigerating plant is installed. The vessel is to be used for general cargo purposes.

The cargo s.s. *Ostmark* has latterly gone through its contract trials successfully. She has been built to Lloyds' regulations, and on the "Isherwood" system. The Flensburger Shipbuilding Company, builders of the *Ostmark*, report that the ship is more rigid and that a very considerable saving in material is effected by using this system. This Company has equipped its shops with special machinery for constructing ships on this system. The displacement of the *Ostmark* is 8,000 tons.

The Hamburg-America line has sold its screw steamer *Ithaka* to the Brazilian Shipping Co., Commercio de Sal of Rio de Janeiro. This boat was built in the year 1894, is of 2,258/1,395 tons and on adopting the Brazilian flag has been given the name of *Cabo Frio*.

The Hamburg passenger steamer *Rustringen* has been sold in compulsory sale for 10,400 krones to a shipper in Norway.

A Hamburg firm has purchased the English four-mast sailing ship *Bermuda*, built in 1893, of 2,846 gross tonnage, for the price of £8,000.

U.S.A.

The keel plates of the new battleship *New York*, a sister ship of the *Texas*, now building, have recently been laid down. The vessel is to have a displacement of 27,000 tons. The *New York* is to be finished by December, 1912.

An order is now to be placed for building four submarines, Nos. 36-39, and estimates have already been obtained from various shipbuilders. The price for the boats ranges from 415,000 to 498,000 dollars. The lowest offer being dependent on the four boats being ordered together.

The forthcoming Marine Budget demands 100 million dollars for new ships. Two new battleships of 27,000 tons each are projected and also a number of smaller vessels.

Portugal.

The Portuguese Government is said to have the intention to build a fleet and is going to demand £8,000,000 for that purpose. The fleet is to consist of three battleships of 19,000 to 20,000 tons, three cruisers of 9,500 tons, eight destroyers, four submarines, and a floating dock. It is said that the ships will be placed with English shipyards.

Chili.

It is intended to place an order for a second 26,000 ton battleship; the first is being built at Armstrong's, and it is said that the U.S. shipyards are competing very keenly for the order, so that it is not improbable that it may go the way of the Argentine ships.

TYNE AND WEAR.—Our correspondent advises us that the shipbuilding industry in this district is very brisk, most of the yards being fully employed and having work in hand to last them well into the next year. Orders continue to be booked and these with the present work in hand ensure a long period of prosperity. Messrs. Sir W. G. Armstrong, Whitworth & Co., Elswick Yard, give the following statement of the work they have completed and have in hand at this shipyard during the present year: The third class cruiser *Weymouth* completed her trials and was handed over for commissioning in October last. H.M. first class battleship *Monarch*, which was launched on the 30th of March, left the Tyne in the middle of November to be docked at Devonport and has since completed her official trials. The *Chao Ho*, a new cruiser for the Imperial Chinese Navy, was launched on October 23rd, the official trials will probably take place early in January. The work on the first class battleship *Rio de Janeiro*, building for the Brazilian Government, is making good progress, a considerable portion of the framing and bulkheads having already been erected. A commencement has also been made with the new first class battleship for the Chilian Government.

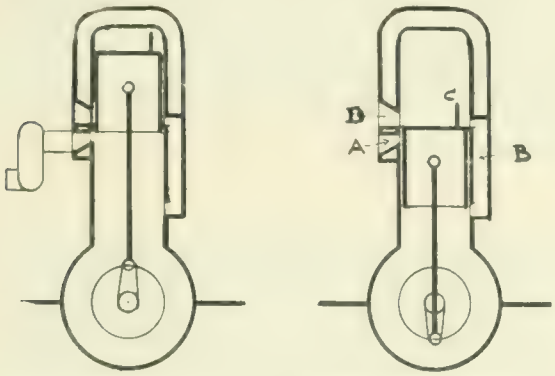
INTERNAL COMBUSTION MARINE MOTORS.

THE adoption of the internal combustion motor for marine propulsion, both for ships and ships' boats, makes it desirable that marine engineers should have a general knowledge of the outstanding principles and details of these engines.

These articles will deal with motors as applied to launches, as it is likely that these will come into much more general use when owners and superintendents realize more fully the great advantages which motor boats have over the usual gigs as supplied to merchant ships.

Motors are divided into two classes, "Two stroke" and "Four stroke." Each of these classes is made to consume petrol or paraffin. Taking them in the above order, we shall first of all consider the "Two-stroke" motor. This design is the invention of Mr. Joseph Day, and has reached its greatest popularity in America, though it is now becoming increasingly popular in this country. Roughly, there are two forms, although there are many variations, namely, the three-port and the two-port design. Fig. 1 shows a diagrammatic section of the three-port design, and the action is as follows :—

On the up-stroke a partial vacuum is formed in the crank case, and when the piston has reached the top of its stroke the port A is uncovered, air rushes in and in passing through the carburettor takes up a certain quantity of petrol. The "mixture," as it is called, fills the crank case and, as the piston descends, the mixture is compressed. When the piston is nearly at the bottom a bye-pass port B is uncovered



Intake and compression Exhaust and Transfer

Fig. 1

by the piston ; the compressed mixture flows from the crank case through B, strikes the deflector plate C which prevents the mixture rushing across the piston and out at the exhaust port D, and fills the cylinder. On the next up stroke a partial vacuum is again formed in the crank case and the fresh mixture drawn in through the carburettor ; at the same time the mixture in the cylinder is compressed and at the top of the stroke, or near it, is fired. The explosion drives down the piston, compressing the mixture in the crank case. Towards the end of the stroke the exhaust port is uncovered, allowing the burnt gases to escape and a little later the bye-pass port is opened which allows the compressed charge in the crank case to flow round and displace the remainder of the burnt gases in the cylinder. The momentum of the fly-wheel carries the piston up, compressing the charge in the cylinder and drawing a fresh charge into the crank case. At the top a second explosion carries on the cycle of events as described. It will be seen that there is an explosion, or a working stroke, every revolution, or, in other words, every two strokes. While the general working is the same, some motors instead of the inlet port A have the carburettor mounted on the crank case with a non-return valve between it and the crank case. The only difference is that air and petrol is drawn in during the whole of the up-stroke instead of just at the top. Against that there is the complication of another working part. Makers seem to incline more towards the three-port design, as it eliminates, what may through lack of attention cause trouble, the valve.

The other type of motor is illustrated diagramatically in Fig. 2 and [illegible] "[illegible]" motor. In it the admission of the mixture and exhaust of the burnt gases [illegible] admission valve, C the exhaust valve and D the exhaust port. [illegible] cam shaft [illegible] The cam shaft is rotated at half the speed of the crank shaft.

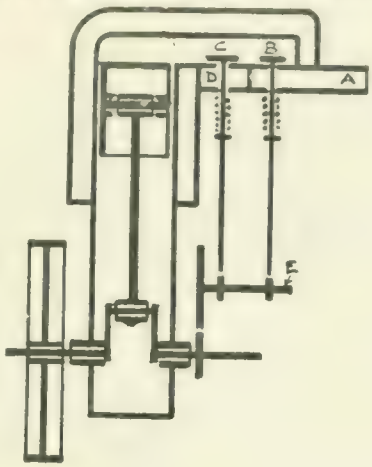


Fig. 2

by means of gearing; it is often called the "half-time" shaft. The cycle of events takes place in the following sequence :—

On the first down-stroke valve B is lifted and as the piston moves down air is drawn in through the carburett r, taking up petrol in its passage, into the cylinder ; at the bottom of the stroke the cam on E passes from under the valve stem of B and the valve is reseated by the spring ; on the up-stroke the mixture is compressed and at the top of the stroke is fired, causing an explosion and driving the piston downwards, both valves being kept seated ; the momentum of the fly-wheel takes the piston upwards on its next stroke, and as the cam underneath C opens C at the beginning of this up-stroke the exhaust or burnt gases are swept out of the cylinder by the piston ; at the top of the stroke C closes and the cycle is repeated. It will be seen that there is only one working stroke every two revolutions or every four strokes.

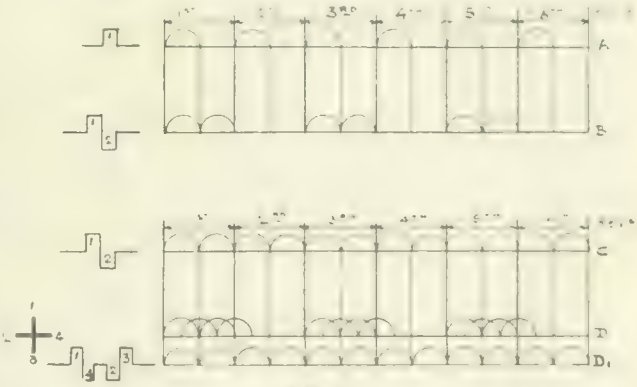


Fig. 3

Order of cylinder firing shown by numbers on crank diagrams.

It is sometimes thought that a two-cylinder four-stroke motor is as even in its turning moment as a single-cylinder two-stroke motor, similarly a four-cylinder four-stroke motor is as even as a two-cylinder two-stroke motor. If the power strokes are examined it will be seen that the two-stroke motor has much the evener of the two turning moments, except in the case of the four-cylinder four-stroke motor, with all four cranks in one plane as shown at D; Fig. 3 explains the point D1. The power strokes are shown as half circles on a base line, which is the circle of the crank pin unrolled for several revolutions.

A is the power stroke diagram for a single-cylinder two-stroke motor.

B is the power stroke diagram for a two-cylinder four stroke motor, cranks in one plane and opposite.

C is the power stroke diagram for a two-cylinder two-stroke motor, cranks in one plane and opposite.

D and D1 is the power stroke diagram for a four-cylinder four-stroke motor, with cranks as shown at the side, D spaced at 90 degs., D1, in one plane and opposite.

The advantages of the two types of motors may be summed up thus. For engines of the same number of cylinders of the same bore and stroke and at the same number of revolutions, the advantages of the "Two-stroke" motor are:—

(*a*) Greater Power. As there are twice the number of working strokes one would think the two-stroke motor would give twice the power of the four-stroke motor, but this is not the case, as the charge of the two-stroke motor is slightly diluted with the burnt gases of the previous stroke. The power is, according to Prof. Durand, about 80 per cent. in excess of the "four stroke," and judging by the rating formula, which will be given later, the excess is about 20 per cent. to 70 per cent. greater. (*b*) less weight, due to fewer working parts; (*c*) a more even turning moment; (*d*) better balance; (*e*) smaller fly-wheel owing to "C"; (*f*) fewer working parts.

On the other hand, the "four-stroke" motor has the advantage of (*a*) slightly higher fuel economy, (*b*) greater range of speed, as the extra "scavenging" stroke and the full suction stroke get rid of most of the exhaust gases and allow a full charge to enter the cylinder.

There is one peculiarity of the two-stroke motor which has not been noted as one of the advantages, as it is thought a special paragraph is necessary to bring it to notice. A two-stroke motor will run equally well in either direction. It will be seen on referring to the diagram that the ports are opened and closed by the vertical motion of the piston; now as the vertical position is independent of the direction in which the crank revolves, the direction of rotation when running depends on the direction of rotation in which the motor is started. In virtue of this peculiarity all two-stroke motors (working on the above described principle) are reversible. The act of reversing, by altering the point of ignition is rather difficult to learn, and at best is uncertain, so reversing gears are generally fitted. These reversing gears are usually fitted to the propeller shaft and reverse it, while the motor runs continually in the same direction; a few depend on the point in the stroke at which the fuel is injected into the cylinder for causing the engine to reverse its direction of rotation. Four-stroke motors are not reversible, as the cam shaft rotates at half the speed of the main shaft, so that the periods of valve setting would be quite upset if the motor was started in the wrong direction. Looking at the diagram of the four-stroke motor one sees that after the exhaust valve has been open, on the next stroke the inlet valve is open. Now reverse the direction; the inlet valve is open, the piston is travelling up so all the mixture is pushed out at the carburettor, next stroke the exhaust valve is open and the piston travelling down draws in a charge of burnt gas to be compressed on the next upward stroke.

(*To be continued.*)

THE "JAMES WATT" ANNIVERSARY will be held in the St. Andrew's Halls, Glasgow, on 19th January, at 6.30 p.m.

MR. H. A. MAVOR read a paper before the Inst. of Engineers and Shipbuilders in Scotland, on December 19th, entitled, "Notes on the Screw Propeller."

THE BATTLESHIP-CRUISER "LION."—The publishers have a few photogravure prints left of this famous warship, 1/- each, framed 2/6 extra, postage, in addition, 3d. and 8d. respectively.

N.E.C. INST. OF ENGINEERS AND SHIPBUILDERS.—On the 15th December the prizes for the best papers read before the Graduate Section during the last session were presented to Mr. E. Leslie Champness, Mr. C. S. Ross, Mr. Summers Hunter, Jun., and Mr. G. F. Haddock, B.Sc. The engineering gold medal was presented to Mr. D. B. Morison, Vice-President for his paper, "The Economical Working of Reciprocating Marine Engines and Their Auxiliaries."

NEW BRITISH AND GERMAN BATTLESHIP-CRUISERS "LION" AND "MOLTKE."

TO compare the *Lion* with the *Moltke* is very much like drawing a comparison between the *Dreadnought* and *Lord Nelson*—the ships are contemporaries only in name, and really belong to two different eras of warship design. That this should be the case reflects both credit upon our construction staff and saddles the Wilhelmstrasse authorities with distinction of a somewhat opposite order, for while the *Lion* may be regarded as a cruiser edition of the *Orion*, the *Moltke* is more or less related to the *Neptune* class which preceded the 13·5″ gunned ships, and is more comparable to the *Indefatigable*.

Both ships are, however, entering into service about the same date, and as examples of the latest word in battle-cruisers on both sides of the North Sea, make a comparison reasonable.

In design the ships represent totally different schools of thought, for whereas the British ship carries all her guns along the centre-line and mounts 13·5″ and 4″ guns, her German "opposite number" follows the *en echelon* example of distribution—now almost universally abandoned—plus centre-line, and carries 11″, 5·9″ and 3·4″ pieces. The pros and cons of each can best be discussed separately, and we will therefore first examine the characteristic features of the *Lion*.

The general outline of the ship can be seen from the plan and illustration. She is an *Orion* with the super-firing guns aft sacrificed, and her protection decreased for the gain of probably eight knots in speed. In order to accommodate the immense engine and boiler power her dimensions show a great increase over previous battle-cruisers, being:—Length over all, 720 feet; beam, 88½ feet; and draught, 27 feet; giving her a displacement of 26,360 tons against the 18,750 tons of the 580 ft. × 80 ft. × 26½ ft. *Indefatigable*. Her main armament consists of eight 13·5″ guns, those in the second turret forward firing over the first pair, with a couple amidships, and also upon a lower deck level aft. These immense guns fire a 1,250 lb. projectile with a muzzle velocity of 2,821 f.s., and exert an energy of 69,000 foot-tons, are 45 calibres in length and weigh 76 tons. Her total weight of discharge compared with the *Moltke's* works out as follows:—

Guns.	*Lion.*	*Moltke.*
Ahead ...	4 13·5″ = 5,000 lbs.	6 11″ = 4,560 lbs.
Astern ...	2 13·5″ = 2,500 lbs.	8 11″ = 6,080 lbs.
Broadside	8 13·5″ = 10,000 lbs.	10 11″ = 7,600 lbs.

which gives the German ship a superiority when fighting astern only, while the advantage of greatly increased range and localised smashing power is with the *Lion*.

The disposition of the *Lion's* guns is perhaps not the best that might have been adopted. The amidship guns certainly have wide angles of fire, but by bringing them aft as in the Japanese *Kongo*, the concentration in the astern axial line could have been increased. This alternate arrangement is the one which has probably been utilised in the *Queen Mary* class.

The structures around the funnels are 2″ blast-screens, which are designed to protect them from the firing effects of this pair of guns, and, from the angle

British Battleship-Cruiser *Lion*.

German Battleship-Cruiser *Moltke*.

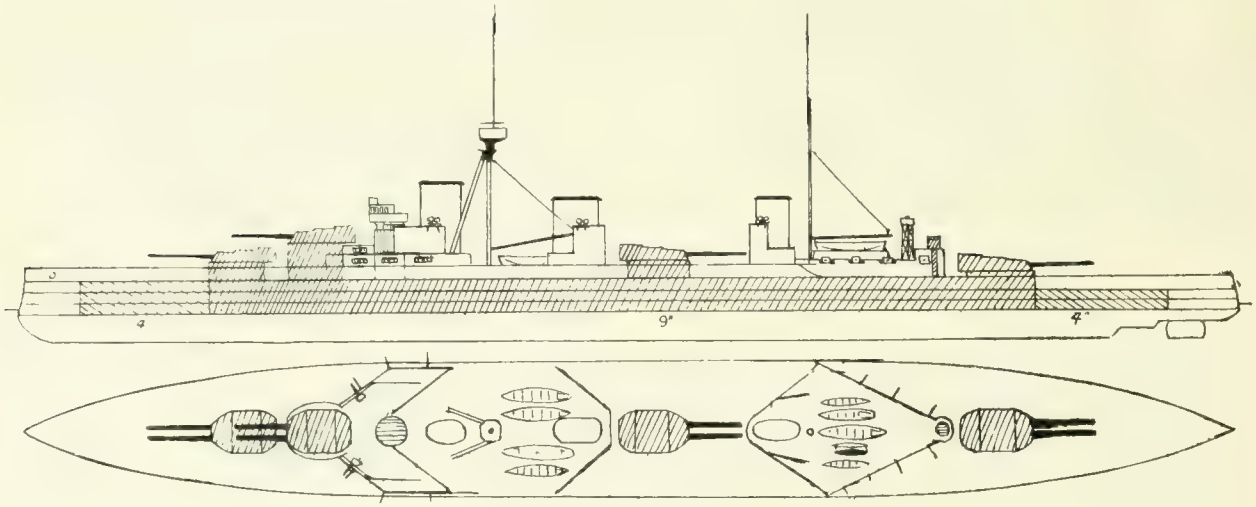
at which they are set, to deflect small projectiles which might otherwise hole the uptakes, and so reduce speed, and enveloping the decks with smoke, make gun-setting difficult. Being clear of the quick-firing guns they have also been fitted to carry searchlights, the old idea of grouping guns and projectors on to bridges, etc., having been discarded in favour of keeping the latter well away from the shock and smoke of the 4″ q.f. pieces.

The anti-torpedo-boat armament of the *Lion* consists of sixteen 4″ guns, firing a 31 lb. projectile. Eight of these are up forward in the superstructure, and eight aft along the boat-deck, being so arranged that a good fire can be brought to bear on any given quarter. Compared with the *Moltke's* secondary batteries of twelve 5·9″ and twelve 3·4″ weapons, the *Lion* appears undergunned as regards this portion of her equipment, and apart from any official assurances to the contrary, we have always regarded the secondary armament of our "Dreadnoughts" as their most unsatisfactory feature.

the main or upper decks can be utilized to protect them, and this must have a thickness of at least 9″ to 10″. That some such arrangement will be embodied in the ships of the forthcoming estimates is practically certain.

At the time of writing the *Lion* has not yet been on trial, so that the palm of being the fastest large ship afloat must be retained by the *Moltke pro tem*, she having reached 29·5 knots on trial. That the British ship will reach 30 seems taken for granted, and with engines of 70,000 H.P. capable of developing probably 100,000, it is more than likely that the German figures will be substantially improved upon.

Great secrecy has been maintained over the protection and armour distribution, so that the following figures cannot be regarded as absolutely "officially" correct, although given by the most recent text-books. The main belt extends to about 20 feet of the extremities and has a maximum thickness of 9¾″, while the strake along the lower deck side is 7″—8″ amidships, both belts tapering fore and aft to 4″. The entry



Plan of H.M.S. *Lion*.

The *Lion's* 4″ guns are unprotected except by thin screens and will obviously be all put out of action during the first half-hour of a big-gun engagement, leaving the ship defenceless against the torpedo attack during the night following—a course adopted by the Japanese with the most disastrous results to the remnants of the Russian fleet which remained after Tsushima. It may, therefore, be argued that unless secondary guns are going to be protected by armour sufficiently thick to keep out the biggest projectiles, they may as well remain unprotected, medium plates such as the *Moltke* carries along her main deck being very little better than our own shields. This must be granted, and the question therefore arises "what constitutes an efficient secondary armament and how can it be economically protected?" If destroyers had not grown to the size of small cruisers, the 4″ gun carried on a disappearing mounting so that it could be stowed away during action in an armoured tube running down to behind thick armour would have been sufficient. But in these days of 1,000 ton boats, a 5″ or 6″ gun seems the only practicable defence, and these must be so disposed that the normal armour of

forward is so fine that the continuation of the belt right up to the bow would have imposed too much strain on the structure; the hull is therefore subdivided fore and aft into many water-tight cellulose compartments constituting a thoroughly efficient substitute for the armour. The big gun turrets have 10″ protection, and a 3″ deck encloses the vitals of the ship.

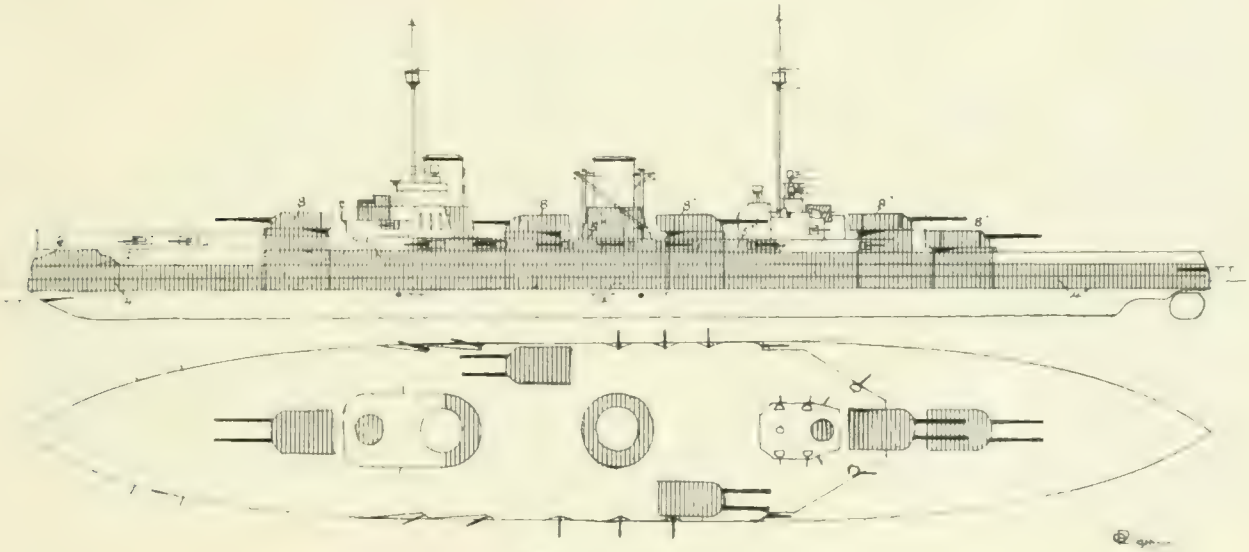
In appearance the *Lion* is quite distinct from any other ship afloat. Her three funnels are all of different dimensions, the foremost being raised well above the bridge, while the third, although of the same height as the second, is thinner and rounded instead of oblong.

The w.t. aerials are suspended from the flying topmast of the tripod to the pole mast aft. Unlike the *Orion* there is no armour wall round the boats, although amidships they are partially stowed behind the funnel screens.

The *Lion* was laid down at Devonport on November 29th, 1909, and launched on August 6th the following year. Her sister, the *Princess Royal*, was commenced at Barrow on May 2nd, 1910, launched on April 29th,

1911, and is now completing for sea. The machinery (Parson's) for both ships was supplied by Messrs. Vickers.

The *Moltke* is an enlarged "Von der Tann," with an extra pair of 11-in. guns aft, a couple more 5·9-in. in the battery, a higher free-board amidships, and some two knots more speed. Her design opens up a wide field for conjecture, for the retention of the *en echelon* placing of the second and third turrets is contrary to the general trend of gun distribution. If the idea finds so much favour, why was it not adopted for the "Helgoland" class? The most probable explanation is that some attempt at homogeneity with the *Von der Tann* was sought after, so that that ship, with the *Moltke* and *Goeben*, should form a tactical unit, an excuse, also, for the mounting of 11-in. instead of 12-in. guns. Whatever may have been the reasons that led to the construction of two ships carrying a main armament of 11-in. guns when rivals were putting 13·5-in. into their ships, the fact remains that the German Navy will have no battle-cruisers capable of tackling the *Lion* for some years to come.



Plan of the *Moltke*.

The dimensions of the *Moltke* are as follows:—Length 610 ft., beam 96¾ ft. (the widest that has yet been given a warship), and draught 27 ft., giving a displacement of 22,632 tons. Her five turrets are placed: one forward, on the forecastle, two *en echelon* amidships, the starboard being the foremost, and two astern, super-firing — an arrangement practically identical to that of the *Neptune*. The twelve 5·9-in. are disposed along the main deck, the grouping on the two sides being two forward of the starboard turret and four abaft it, and five forward and one abaft the port. These are behind 5-in. armour. The twelve 3·4-in. are carried in the bows and on the two superstructures, one being placed just below the superimposed turret. Incidentally, this gun does not show up well in current photographs of the ship, but the port is quite a large one, and when the writer inspected the ship at Hamburg last July, the first impression was to regard it as a 5·9-in. emplacement, and credit the *Moltke* with fourteen of these guns. These 3·4-in. throw a 24-lb. projectile at the rate of twelve a minute, and although mounted to repel anti-torpedo-boat attack, will probably be of little use except against small craft.

With a designed H.P. of 50,000, the *Moltke* has already reached over 29·5 knots, her power having worked up to somewhere in the region of 85,000 H.P. Her lines are particularly fine despite her huge beam, the bow flare being very pronounced. It will be noted that the 3·4-in. guns there are not sponsoned as in *Von der Tann*, an amelioration that has improved the "dryness" forward.

Details of her protection can be gathered from the plan. The belt is 7½ to 8-in. amidships, tapering to 4-in. bow and stern, the lower deck side 5-in. and battery ditto, while the turrets have 8-in. walls.

A prominent feature of the ship is her immense funnels, with their wide, sloping bases—probably armoured, although details on this point are lacking. Like the new battleships, she carries torpedo-nets along the main deck.

The *Moltke* was laid down in April, 1909, launched April 7th, 1910, and is now entering service. Comparative features are as follows:

	Lion.		*Moltke.*
Displacement..	26,360 tons	...	22,632 tons
Torpedo tubes	5 21"	...	4 19·5"
Armament ...	8 13·5"	...	10 11"
	16 4"	...	12 5·9"
		...	12 3·4"
Cost.....	£2,100,000	...	£2,380,000
Cost per ton ...	£79·5	...	£105·1
Coal supply ...	1,000/3,500	...	1,000/3,100

[illegible] The publishers will be pleased to [illegible] packed, books on any subject; a remittance to cover should [illegible] order.

[illegible] have found it necessary to secure more commodious [illegible] Bromsgrove Street and [illegible] Dean Street, Birmingham.

THE FLEETS OF THE MAIL LINES.

(*From our Own Correspondent.*)

A Remarkable Appeal.

THE steamship *Elingamite* was built in the year 1887 at Newcastle by Messrs. C. S. Swan & Hunter. She was a single-screw vessel of about 2,585 tons gross register, specially constructed for the mail and passenger services of Messrs. Huddart, Parker and Co., of Melbourne. In the month of November, 1902, she sailed from Sydney for Auckland, with a general cargo, a quantity of treasure, 136 passengers and fifty-eight crew, but on the 9th of that month was wrecked on Three Kings' Island. There was unfortunately considerable loss of life—forty-three persons being drowned altogether. The passengers and crew were safely got away in six boats and two rafts, and no less than seventy of these persons were picked up from the two rafts and two of the boats by the steamship *Zealandia*. A number of other passengers and crew landed on the coast, whilst a third contingent were rescued by H.M.S. *Penguin*, but some of this last party had already succumbed to exposure. Altogether some thirty-one passengers and twelve of the crew were lost. An enquiry followed, and after the hearing the certificate of Captain Attwood, master of the *Elingamite*, was suspended for twelve months. That seemed to close the story of the wreck.

In the nine years, however, which have passed since the vessel was wrecked a new survey of the vicinity of the disaster has been made and it has been proved that the then-existing charts were materially incorrect. This being so Captain Attwood has moved the authorities to re-open the enquiry, and an Act of the Legislature has at last been passed to enable this to be done, for owing to the length of time which intervened since the hearing of the inquiry it would have been otherwise impossible to re-open the case. At the re-hearing the Court came to the conclusion on the new evidence now available that the charges of negligence made to and accepted by the former Court were not proven and accordingly he has now been acquitted of all blame in the matter.

The Stranding of the "Delhi."

Considering the number of ports to which the vessels of the P. & O. Company trade, and the long coasting voyages which many of their steamers make, it is astonishing that their record of disaster is as low as it is. One is, therefore, surprised indeed when one hears of a disaster to a P. & O. steamship. Those who are interested in omens—or shall I say co-incidences—will be interested to observe that the stranding of the steamship *Delhi* at Cape Spartel took place on the 13th of the month and on the very day on which the King-Emperor proclaimed the City of Delhi as the capital of the Indian Empire. The *Delhi* is a fine ship enough. Smaller indeed than the ten vessels of the "M" class which are chiefly employed in the Australian and Bombay mail services, she was nevertheless a vessel of over 8,000 tons, fitted with twin screws which gave her a speed of some 16 knots. She was good enough to be chosen by the Princess Royal and her husband the Duke of Fife, for the conveyance of themselves and their family to Egypt for a Christmas vacation and the opening of the Khartoum Cathedral. With a cargo worth approximately a million sterling—there being bullion and specie amongst it—and a full list of passengers, this vessel, for some reason which will doubtless hereafter be ascertained, went ashore at 1 a.m. on the morning of the 13th December, two miles to the South of Cape Spartel, in a heavy sea. She bumped three times before she became fast, lying fortunately on a sandy bed. She, of course, at once sent off wireless cries for aid. To these a French man of war at once responded, her crew doing great service in landing the *Delhi's* passengers, though at the sacrifice of the lives of three French man o' warsmen. It will hardly be believed that, owing to the red tape which still hampers the efficiency of the British Navy, Gibraltar at first took no notice of the messages, it having been ordered that the naval station is not to take in mercantile messages. The order was, of course, obeyed with the strictest and most ridiculous fidelity, naval service officials not being allowed to discriminate. This little feature of the disaster is one which it is to be hoped will meet with searching criticism in view of future emergencies. However, in spite of the delay occasioned by red tape, British warships in considerable numbers, as well as the Gibraltar lifeboat, hurried to the scene of the disaster, and all the passengers and those of the crew whose services were not at the moment required, were safely, though with difficulty, got ashore. The crux of the position was the landing of a passenger of sixty-five years of age, who had had the misfortune to break his leg, for the use of the breeches buoy was obviously denied to him. After a considerable pounding from the heavy seas the *Delhi* had a respite and thereupon a contract for her floating was arranged with the United Salvage Company, but it appears from later reports that the *Delhi* will prove a total loss.

The Royal Mail Company and the Union-Castle Line.

So after all the Union-Castle Company is to be merged in a Combine! The continuous rumours which have flown about during the last month or two and the steady rise in the price paid for its shares have been founded on a fact, even if denials have been given to the statements that the intending purchasers were first Lord Pirrie and then Sir John Ellerman. Lord Pirrie is not the actual purchaser. But the real buyer is one closely associated with him. For it will be remembered that not so many months ago it was Lord Pirrie and Sir Owen Phillips who joined hands to take over the numerous interests left by the late Sir Alfred Jones. What with his interests in the Royal Mail Company itself; the Pacific Steam Navigation Company, whose shares that Corporation holds; Messrs. Lamport and Holt's Line, which is being re-organised under the Owen Philipps-Pirrie sanction; the Elder Dempster interests; and now the Union-Castle purchase; the new Combination will be by far the biggest shipping organisation in the world, eclipsing the Morgan affair, which caused so much stir a few years ago, by hundreds of thousands of tons. The Union Castle Line alone means fifty vessels of an aggregate of over 320,000 tons gross register. The Lamport and Holt Fleet again comprises some thirty steamships of a total tonnage of 157,000. These two additions together make up eighty vessels of over 477,000 tons, and even before these purchases were announced the total controlled by the Royal Mail and its associated companies was not far short of three-quarters of a million tons of shipping.

The heads of the proposed agreement for the sale of the business have been carefully thought out in the interests of those who have served the firm of Messrs. Donald Currie and Co. so faithfully and provide against the loss of employment by them to an extent which is, I think, unprecedented in such arrangements. Messrs. Donald Currie & Co. have ever been considered the best of employers and their last act is characteristic of their consistent policy throughout their long and successful business career. I say their last act, for they by the agreement undertake not to have anything to do with any steamship company connected with South Africa, or indeed Africa generally, and so it may be considered that they to all intents and purposes retire from business, for if they still trade it must be in connection with entirely new fields of enterprise. I should add that the Hotel Company and the African Boating Company, which were off-shoots of the main organisation, are also included in the deal.

A Paddle Steamship.

The South-Eastern and Chatham Managing Committee have now sold the steamship *Calais*, one of the three sisters built for the Dover and Calais service by Messrs. Denny and Co. of Dumbarton, in the year 1896. In recent issues I have chronicled the disposal of the other two of the trio and now the disappearance of the *Calais* removes the last paddler from their fleet. It has not taken the turbine many years to bring about this vast change in the material of their fleet and to give an immense boon to their customers.

The Cunard Company

is re-arranging and increasing its capital in view of its agreement with the Anchor Line of Glasgow. This new deal, coupled with the previous purchase of the three Canadian passenger steamships of the Cairn line, and the large building programme on which they have embarked, have made such a course a matter of necessity, and no doubt the expansion of resources now taken will enable them to make further alliances should opportunity offer. For recent amalgamations and combinations in the shipping world will make it incumbent on up-to-date managers to combine wherever favourable opportunities present themselves.

The Company had a piece of bad luck when, through the

parting of a mooring chain in the Sloyne, the *Mauretania* went on to the Pluckington bank, and was thereby debarred from taking the sailing of the 9th December on a quick turn voyage which was to eclipse her great performance of twelve months ago. Moreover, it would seem that her short sojourn on the sand must have strained the fabric of the ship a good deal, since the announcement is made that she will be in dry dock for some eight weeks before she is fit to return to her station. The *Lusitania*, though not perhaps so much boomed a vessel as the sister ship, was ready for the emergency, having arrived at Liverpool the previous Monday and not been scheduled for sailing again till the 16th December, she was turned round at once and punctually to time went off in the *Mauretania's* place. It will be remembered that when in December, 1910, the *Mauretania* made the quick Christmas turn she was dry-docked and prepared for the race against time. These advantages by the exigencies of the case were denied to the *Lusitania* on this occasion. But she went out in practically the same time as the *Mauretania* and was turned round in an even shorter period. The appointed hour for her departure from her dock on the eastward run was four o'clock on the Saturday afternoon, and she was ready as arranged. But unfortunately there was a dense fog and so she would not leave her dock till two hours later, and did not get away from the Ambrose Lightship till ten o'clock that night. Once on blue water, however, she seemed to find no difficulty in making the desired speed.

By the completion of this trip the *Lusitania* has now made thirty-four trips in one year and five days. Her outward mean speed has been 24·67 knots and inward 24·66. Her fastest trips have been run at 25·37 outward and 25·1 knots homeward.

Waves breaking over the decks of the *Delhi*

REVIEWS.

Transactions of the Institution of Engineers and Shipbuilders in Scotland, Vol. LIV. (Glasgow: Published by the Institution, 39, Elmbank, Crescent).

As a record of the proceedings of the fifty-fourth session (1910-11) of this well-known institution the volume before us is in every way as complete and valuable as its predecessors. The main portion of the volume, occupying 460 pages, with many full-page illustrations and folding plates and tabular matter, consists of papers read during the session and discussions thereon. The address of the president, Prof. Archd. Barr (whose photo is given as frontispiece), dealing with the scope and status of the engineering profession, leads off the proceedings, and is followed by a variety of practical and of theoretical papers dealing with subjects of the first importance to engineers and shipbuilders. The chief contributions are:—"Boiler economics and the use of high-gas speeds," by Prof. John T. Nicol, on D.Sc.; "Experiments on the efficiency of a five-stream feed heater," by Prof. A. H. Gibson, D.Sc.; "On means for economising fuel and utilising waste heat in malleable iron and steel works," by Thos. B. Mackenzie; "The black coefficient," by P. A. Hillhouse, B.Sc.; "The detection of petroleum vapour or gas," by John C. Heck; "Heating installations of passenger ships," by A. Nicol Low; and "Large power fitting-out cranes, with special reference to electric revolving cantilever cranes," by Robert Boyle, B.Sc. The last-mentioned paper is very practical and informative and occupies about ninety pages. The volume of course contains a list of office-bearers, past presidents, articles of association, minutes of proceedings, etc., and obituary notices of deceased members. The work, as usual, reflects high credit on Mr. E. H. Parker, secretary of the Institution.

Steam Turbine Design. By John Morrow, M.Sc., D.Eng., London: Edward Arnold. Price 16s. nett.

THIS work deals with the reaction turbine chiefly, although not entirely. It is customary by most authors to treat the subject of steam turbines in such a manner that the reader has to master the somewhat subtle subject of the flow of steam through nozzles before proceeding to the portions dealing more especially with the reaction turbine. The author has adopted a different mode of treatment of his subject by first dealing with the entropy diagram and other charts so that the reader becomes thoroughly acquainted with these before coming to the design of nozzles. The work is divided into twenty-one chapters and has in addition an appendix on the geometry of the screw propeller. The opening chapter deals with reaction turbines in general and the following chapters deal with the matter progressively. First the fundamental principles are fully explained and the application of expansion diagrams thereto is then dealt with. The question of design is then treated, first on general lines, secondly with regard to the theorems relating to reaction turbines and finally as affecting marine turbines. After a chapter on heat diagrams the author passes on to the subject of exhaust steam turbines, the effect of heat accumulators and the combination of reciprocating and turbine engines. The scantlings of the various portions of the stator and rotor elements are dealt with on the basis of formulæ and examples are given to illustrate the methods proposed. The theory of labyrinth packing is ingeniously stated, and the functions and proportions of bearings, thrust blocks, adjusting gear glands and dummy and balance pistons are fully explained. The chapter on governors and valves contains much useful matter presented in such a manner as to be readily understood and appreciated by an intelligent reader. While dealing with marine turbines in particular involving general considerations and examples the author proceeds to treat the cognate subject of propellers for use on turbine vessels and the merits

of reduction gearing for the purpose of dealing with the high-speed rotation of the turbine and the low-speed rotation of the propeller. An important feature in the subject of turbine operation is the matter of surface condensation, and general principles and condenser design are set out with great lucidity and precision. The twentieth chapter is devoted to orifices and nozzles and is a mathematical treatise on this subject. To wind up this interesting and original work the author describes and illustrates the impulse turbine and deals with the combined impulse-reaction device. We are certain that engineers interested in the subject will study the volume with refreshing effect, not only on account of the method of treatment, but also for the value of the matter to the designer.

Elementary Graphic Statics. By W. J. Crawford, D.Sc. London: Charles Griffin & Co., Ltd. Price, 2/6 nett.

THIS work comprises 131 pages of text with diagrams and examples dealing with the principles underlying graphic statics and is of particular use to the student who is studying engineering, building construction, and allied subjects. There is no doubt that the person who is thoroughly grounded in the theory and practical application of graphic statics can dispense to a large extent with the use of mathematics, especially mathematics of the more complex character. The author in the opening chapter deals with the definition of various fundamental matters in order to clear the ground for subsequent treatment. The necessary experimental apparatus of a simple character for practical demonstration of the direction and amount of various forces is described and illustrated and the practical application of the results fully explained. Each section of the subject is associated with a series of questions as examples for the student to work out. The basis of the questions is that on which the examinations of the Board of Education and kindred examining bodies are formulated with regard to graphic statics given in the subjects of mechanics, geometry, machine design, and building construction. We congratulate the author not only on his lucid treatment of the subject, but on the concise method of presentation of the subject.

Thermodynamics of the Steam Turbine. By C. H. Peabody. Chapman Hall, London. Price, 12/6 nett.

THE author, a professor at a College in the U.S.A., from his position as a teacher and a writer on the steam engine, is one of the few that may be said to be competent to deal with a complex subject like the present. It is new and has to be reduced to rule and this has not previously, as far as we are aware, been taken in hand by anyone. There are Rankine's rules of the thermodynamics of steam and multifarious works on the reciprocating engine, but with the success of the steam turbine there was sure to be someone to come forward and put in figures what has been accomplished in actual practice, and it speaks well for the United States that one of their leading professors has been able to undertake the task. A writer has in this case to start quite afresh, as there is so little to work upon. The acting medium, steam, is the same as with a reciprocating engine, but the way it works in a turbine is totally different. In the one case you press against a piston and the motion is changed to a rotary one through the crank arm, but with the turbine the rotary direction is given at once and instead of dealing with valves and cut off, the steam plays continuously on vanes of a wheel and through guides on vanes in succession to give the turning movement, till of course it is completely exhausted. It is obvious therefore that the old and the new methods are quite distinct, and in making rules for the latter the author has to proceed on different lines altogether. Here we may say we think the author has done the greatest possible with the subject. He leads where others may follow. They may be able to improve on what we find here, as they will have the advantage of these pages to guide them. What then are the features we find here? The answer is in the main a few first principles which it was necessary to insert because of the peculiarity of turbines. Entropy, for instance, is explained as the special function for the adiabatic changes of steam, and it is shown how to express it numerically. To obtain full benefit from such a volume as this a reader would have to be scientifically trained, yet the average man, if he had experience of turbines, would find much to interest him. Leading types are shown, but they are treated with a view to design, and what is the best that can be got out of each system. Naturally, nozzles come in for close treatment, as it is from these the steam issues before doing work, and it is seen how to obtain sizes from a given pressure of steam. Then there are the different types of vanes and the effects of friction which are important in a turbine. The author shows that compounding is necessary in a turbine as it is in a reciprocating engine, for extraneous reasons. You cannot keep a true adiabatic curve in either case, there being with the turbine loss from friction and in passing from stage to stage, and with the engine from condensation through the cylinder walls. It is impossible to follow the author through his rules for blade lengths and construction. All are elaborately dealt with. In the types of turbines we rather have principles than particular makes, and this is as it should be, but the leading styles such as Westinghouse, De Laval and Curtis, are found. Marine types are specially dealt with and here the Parsons system comes in. The data given are for vessels mostly in the American service, which may be possibly considered an advantage. If the author has drawn upon examples in this country or from other sources he has known how to do so most efficaciously. He gives us details of the return of steam from the auxiliaries to the turbine, say, at the fifth stage. We mention this to show the extreme minuteness with which the subject is treated. This is the case throughout. We have also comparison of turbines with ordinary engines in British Thermal Units, and we should say, that for all those charged with design of this new form of power, or having the care of same, and wishing for an intelligent knowledge of its capabilities that they ought not to be without a copy of the volume before us. It certainly deserves to take a premier position and cannot fail to be so received among engineers.

MARINE MOTOR NOTES.

THE closing month of the year has been fruitful of interest in connection with the marine motor. Messrs. Paton, Glasgow, have, we understand, been led to decide upon adopting two-cycle oil engines of about 90 B.H.P. for new vessels on order for coasting and canal traffic through the Forth and Clyde canal. Other similar vessels will probably follow for the same firm. The canals throughout the country might well be fully employed by means of oil-engined barges trading regularly over the districts traversed by them. The time now taken for the delivery of goods by rail is such that these barges could successfully deal with the traffic on most favourable terms, and we commend this again to the attention of those who have been meditating a development of this branch of service, as there is great disturbance and much loss and inconvenience experienced by many who are at the mercy of delayed railway traffic even in the neighbourhood of canal termini. Several Scottish firms have in view the building of coasters and short-passage vessels to be fitted with oil engines. Especially are these capable of economical service, where there are many stoppages and calls by the way on account of the reduced stand-by losses compared with steam. The most convenient and serviceable gear for cargo and warping purposes has yet to be determined, but one method of a simple kind is to use the propelling engine for the winches, by transmitting the power by a chain-drive from the main shaft. Such a method would involve a disengaging clutch for the propeller shafts or other means of disconnecting. Another vessel is about to be built to follow the *Toiler*, now in active service on the Canadian Lakes, and from what we can gather this vessel has quite come up to expectations. Intervening circumstances prevented our being present at the trials on the Clyde of the Marquis of Graham's oil-engined yacht *Mairi*, early in December. These were very successful on a twenty-four hours' continuous run, the Beardmore engines running on crude oil, behaving well, both on the straight runs and during the manœuvring, while adjusting compasses. The *Mairi* is coming south, calling at several ports *en route* on a visiting tour. Referring to former comments on the two-cycle and four-cycle engines, it may be remarked that in the case of the semi-Diesel type, the initial cost is considerably less, approximating to £500 in engines of 150 B.H.P. This type of engine necessitates the starting lamp for heating-up, but many do not consider this a great disadvantage for small powers. We note the establishment of new depots for oil

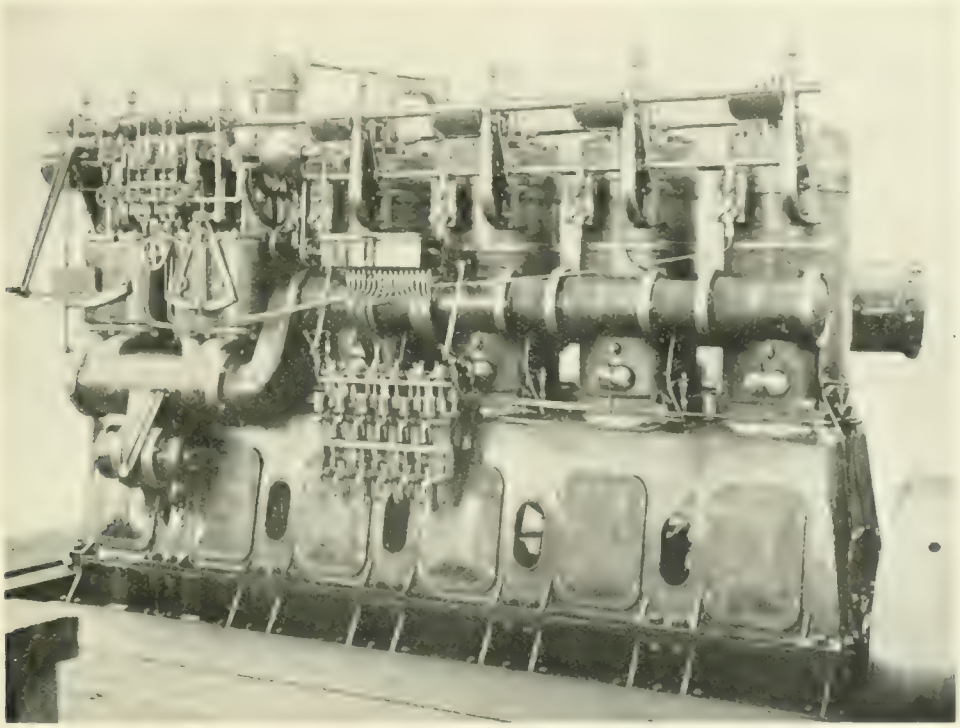
storage, such should be of great service as well for steamers using oil fuel, and these are increasing as for oil-engined vessels. Messrs. Mechan & Sons, we noted, at Scotstoun were well occupied with small boats for oil engines, and two boats for South America and Egypt for river traffic were about ready for despatch. The several builders on the Clyde appear to be well occupied with orders, and the lochs show a goodly number of boats and yachts fitted with oil engines, and in accounts received from the East coast the frequent appearance of various classes of vessels similarly fitted, whether for carriage of cargo, the fishing industry, or pleasure, indicates considerable extension.

PNEUMATIC TOOLS IN SHIP REPAIR WORK.

IN connection with the contract for repairing the Cunard liner *Mauretania* (which was driven aground in the Mersey during the second week in December) given to Messrs. Grayson, Ltd., shipbuilders and repairers, Liverpool, an expeditious provision of pneumatic working plant was made by Messrs. John Macdonald & Son, pneumatic tool specialists, of Watt Street, Maryhill, Glasgow. The huge steamer was berthed in the Canada graving dock, Liverpool, on the 14th December, and after examination some eighty plates on the bottom amidships were marked for removal and replacement. The work of drilling out the rivets by pneumatic drills and of fastening the new or renovated plates by pneumatic riveting hammers, in which the acme of expedition will be attained, will nevertheless occupy five or six weeks. Asked on December 10th to submit quotations, and promptly doing so, Messrs. Macdonald & Son received the order for the plant required on December 14th and the same evening all the plant was despatched to Liverpool, and the tools were being laid down alongside just as the huge liner was being drawn into the basin. The plant consists of five air compressors, thirty-eight pneumatic drills and hammers, and all the necessary hose and accessories. The total air capacity of the compressors is about [illegible] cubic ft. of free air per minute, and they are designed for compressing air to 100 lbs. per square inch. The value of the order is about £1500.

RONALD TRIST & CO., LTD.

THIS very enterprising and progressive firm are ever on the look-out for opportunities of enabling their customers and those interested in packing to have information which may be useful to them in the selection of goods sold by them. We have received a copy of the new edition of their Blue Book and Furnace Booklet dealing with "Sea Rings" system of packing for glands. The record of what can be done in the way of work with this class of packing is set out in a terse and incisive manner, based on actual experience under a variety of conditions, and for various purposes in connection with machinery all over the world. So much interest has been taken in the subject matter of the Blue Book that it has been found necessary to issue editions in German, Spanish and French. In order to facilitate the work of customers in ordering, particularly by telegraph, special codes have been devised, enabling a customer to construct a code word acceptable under the usual telegraphic regulations, by which the fullest information for an order can be transmitted by the customer to the firm with a certainty of correct fulfilment. In the Furnace Booklet they include not only a complete tabular schedule of prices for every size in lots of twelve rings, but in addition they insert a diagrammatic representation of sections of the packings in all sizes from [illegible] in. to [illegible] in. It will be remembered that this firm also sell Daniels' PPP Packings and the ingenious Thermofeed Water Regulator and Governor. It is claimed that the latter will fully pay for itself in less than six months by maintaining automatically, a constant water-level, ensuring a maximum efficiency of steam power with a minimum supply of fuel.



A 260 h.p. Polar-Diesel Marine Engine that has been fitted in the British 2,000 ton sailing vessel *Sound of Jura*, owned by the Southern Whaling and Sealing Co., of North Shields.

INSTITUTE OF MARINE ENGINEERS. The syllabus for the Winter Session provides for the reading of the following papers: On January 15th, "Auxiliary Machinery for Internal Combustion Engines," by Mr. W. K. Cummins. March 4th, "Details of a Marine Engine," by Mr. W. Vesey. March 18th, "Oil Fuel Fittings and Improvements," by Mr. Jas. Anderson, R.N. On February 12th, The Most Hon. the Marquis of Graham, C.B., will deliver his Presidential Address. The annual meeting of the Institute will be held on March 14th. Mr. Summers Hunter has been nominated as President for the Session 1912-1913.

Summary of Shipbuilding Returns of United Kingdom in 1911, arranged in order of Tonnage built by each Firm.

No.	Name of Firm.	Place.	No. of Vessels.	Total Tons. †
1	Swan, Hunter & Wigham Richardson, Ltd.	Tyne	24	128,050
2	Harland & Wolff, Ltd.	Belfast	10	118,207
3	Sir W. G. Armstrong, Whitworth & Co., Ltd.	Tyne	15	71,121
4	Irvine's Shipbuilding & Dry Docks Co., Ltd.	Hartlepool	16	75,130
5	Russell & Co.	Clyde	14	72,220
6	Northumberland Shipbuilding Co., Ltd.	Tyne	13	66,400
7	Workman, Clark & Co., Ltd.	Belfast	10	66,577
8	John Brown & Co., Ltd.	Clyde	8	65,615
8a	Vickers, Ltd.	Barrow		49,363
9	Wm. Denny & Bros.	Clyde	—	40,456
10	Barclay, Curle & Co., Ltd.	Clyde	8	40,134
11	Fairfield Shipbuilding & Engineering Co., Ltd.	Clyde	6	40,107
11a	R. & W. Hawthorn, Leslie & Co., Ltd.	Tyne	12	39,904
12	Palmers Shipbuilding & Iron Co.	Tyne	6	39,342
13	Alexander Stephen & Son, Ltd.	Clyde	8	38,159
14	Chas. Connell & Co., Ltd.	Clyde	8	37,850
15	Sir Raylton Dixon & Co., Ltd.	Tees	13	36,782
16	J. Readhead & Sons	Tyne	8	32,011
17	Craig, Taylor & Co., Ltd.	Tees	6	31,793
18	Scott's Shipbuilding & Engineering Co., Ltd.	Clyde	5	31,478
19	Short Bros., Ltd.	Wear	6	31,424
20	Wm. Beardmore & Co., Ltd.	Clyde	3	31,400
21	D. & W. Henderson & Co., Ltd.	Clyde	6	29,247
22	Ropner & Son	Tees	11	28,570
23	Cammell, Laird & Co., Ltd., Birkenhead and Tranmere	Mersey	36	27,224
24	Wm. Hamilton & Co., Ltd.	Clyde	6	26,101
24a	Bartram & Sons	Wear	5	24,610
24b	Thames Ironworks Shipbuilding & Engineering Co., Ltd.	E. Channel	—	23,570
24c	Caird & Co., Ltd.	Clyde	2	23,477
25	Wm. Dobson & Co.	Tyne	10	21,227
26	Earle's Shipbuilding & Engineering Co., Ltd.	Humber	9	20,100
27	A. McMillan & Son, Ltd.	Clyde	4	19,901
28	Sunderland Shipbuilding Co., Ltd.	Wear	7	19,469
29	Tyne Iron Shipbuilding Co., Ltd.	Tyne	5	19,459
30	Sir James Laing & Sons, Ltd.	Wear	4	17,486
31	Caledon Ship & Engineering Co., Ltd.	Tay	8	16,821
32	Wood, Skinner & Co., Ltd.	Tyne	8	15,118
33	A. Rodger & Co.	Clyde	4	15,066
34	Robert Thompson & Sons, Ltd.	Wear	6	14,733
35	J. Blumer & Co.	Wear	5	14,701
36	John Priestman & Co.	Wear	5	14,631
37	Napier & Miller, Ltd.	Clyde	9	14,004
38	Clyde Shipbuilding & Engineering Co., Ltd.	Clyde	6	12,376
38a	Smith's Dock Co., Ltd.	N. Shields	—	11,983
39	Greenock & Grangemouth Dockyard Co.	Clyde & Forth	9	11,543
40	Wm. Pickersgill & Sons	Wear	4	11,262
41	London & Glasgow Shipbuilding Co.	Clyde	2	10,800
42	S. P. Austin & Son, Ltd.	Wear	6	10,047
42a	Osborne, Graham & Co.	Wear	7	10,001
43	Blyth Shipbuilding & Dry Docks Co., Ltd.	Tyne	6	9,258
44	Goole Shipbuilding & Repairing Co., Ltd., and Associated Firm Dundee Shipbuilding Co.	Goole	32	8,905
45	Cochrane & Sons	Humber	39	8,533
46	Cook, Welton & Gemmell, Ltd.	Humber	28	7,521
47	Campbeltown Shipbuilding Co.	Clyde	4	7,400
48	Wm. Harkess & Son, Ltd.	Tees	7	7,117
49	Lobnitz & Co.	Clyde	26	6,565
50	Ailsa Shipbuilding Co., Ltd.	Clyde	18	6,562
51	John Crown & Sons, Ltd.	Wear	5	6,264
52	Ferguson Bros.	—	9	6,132
53	Simons & Co., Ltd.	Clyde	10	6,100
54	Mackie & Thompson, Ltd.	Clyde	31	5,549
55	G. Rennie & Co.	Greenwich	33	5,323
56	Hall, Russell & Co.	Aberdeen	14	5,225
57	Ramage & Ferguson, Ltd.	Forth	5	5,104
58	R. Duncan & Co., Ltd.	Clyde	1	4,905
59	John I. Thornycroft & Co., Ltd.	S'ton	—	3,852
60	A. W. Robertson & Co.	Thames	18	2,774
61	The John Duthie Torry Shipbuilding Co.	Torry (Dee)	18	2,751
61a	Alley & MacLellan, Ltd.	Clyde	25	2,630
62	J. Samuel White & Co., Ltd.	E. Cowes	—	2,627
63	George Brown & Co.	Clyde	7	2,524
64	John Fullerton & Co.	Clyde	4	2,140
65	Lytham Shipbuilding & Engineering Co., Ltd.	Lytham	16	2,132
66	John Chambers	Lowestoft	24	1,986
67	Dublin Dockyard Co.	Dublin	2	1,976
67a	Joseph T. Eltringham & Co.	S. Shields	8	1,972
68	Jos. Scarr & Sons, Ltd.	Humber	9	1,860
69	Alex. Hall & Co., Ltd.	Aberdeen (Dee)	10	1,650
70	R. Williamson & Sons	Mersey	2	1,637
71	C. H. Walker & Co., Ltd.	Chepstow	8	1,573
72	Ardrossan Dry Dock & Shipbuilding Co.	Clyde	5	1,533
73	Henry Scarr	Humber	10	1,470
74	Forrestt & Co., Ltd.	Thames	—	1,391
75	Ritchie, Graham & Milne	Clyde	—	1,340
76	Scott & Sons	Clyde	7	1,280
77	David J. Dunlop & Co., now Dunlop, Bremner and Co., Ltd.	Clyde	1	1,156
78	Edwards & Co., Ltd.	Thames	14	1,072
79	Isaac J. Abdela & Mitchell, Ltd.	Mersey	10	1,070
80	Murdoch & Murray	Clyde	4	998
81	W. J. Yarwood & Sons	Mersey	13	981
82	Camper & Nicholson, Ltd.	Gosport	—	976
83	J. P. Rennoldson & Sons	Tyne	5	820
84	Isaac Pimblott & Sons	Mersey	—	727
85	Mackay Bros.	Forth	3	705
86	John Cran & Co.	Forth	16	602
87	Crabtree & Co., Ltd.	Gt. Yarmouth	7	581
88	Beeching Bros., Ltd.	Thames	9	550
89	Fellows & Co., Ltd.	Gt. Yarmouth	6	508
90	Hepple & Co., Ltd.	Tyne	6	449
90a	Philip & Son, Ltd.	E. Channel	10	374
91	W. H. Warren	Humber	11	358
92	William Walker	Maryport	1	291
93	Larne Shipbuilding Co.	Larne	2	240
*1	Wm. Doxford & Sons, Ltd.	Wear	17	98,423
*2	W. Gray & Co., Ltd.	Tees	18	84,882
*3	Joseph L. Thompson & Son, Ltd.	Wear	9	44,877
*4	Richardson, Duck & Co., Ltd.	Tees	8	36,244
*5	Fleming & Ferguson, Ltd.	Clyde	10	6,700

Yarrow & Co., Ltd. .. .. Clyde
950 tons, but in addition 2 T.B.D.'s not measured.
Edwd. Finch & Co., Ltd. .. .. Chepstow
650 tons, but in addition tonnage of 10 small lighters not given.

† Board of Trade gross tons register.
* Board of Trade gross tons register, including erections.

List of Vessels Launched in 1911.

ENGLISH.

THE TYNE.

Sir W. G. Armstrong, Whitworth & Co., Ltd., Newcastle-on-Tyne.

Name of Vessel.	Built of	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
Mogileff, Screw	Steel	Foreign	5,000	—	3,000
Sandefjord, Screw	,,	,,	6,027	—	3,500
H.M.S. Monarch	,,	British	22,630	–	27,000
Helvetia, Screw	,,	,,	4,975	—	2,880
Kamouraska, Screw	,,	,,	4,903	—	2,880
Grof Khuen Hedervary, Screw	,,	Foreign	5,036	—	2,350
Atlantica, Screw	,,	,,	5,039	—	2,350
Clan MacGillivray, Screw	,,	British	5,023	—	4,300
Chao Ho	,,	Foreign	2,750	—	6,500
Caisson	,,	British	700	—	—
Ranvik, Screw	,,	Foreign	5,780	—	2,950
Cho-San Maru, Screw	,,	,,	2,832	—	1,700
Annan Maru, Screw	,,	,,	2,829	—	1,700

Blyth Shipbuilding and Dry Dock Co., Ltd., Blyth.

Name of Vessel.	Built of	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
† Rothley, Screw Steamer	Steel	British	3,942	–	2,150
† Steam Hopper Barge	,,	,,	672	—	650
† Steam Hopper Barge	,,	,,	672	—	650
† Transporter, Screw Steamer	,,	,,	1,554	—	1,345
† Crayford, Screw Steamer	,,	,,	1,209	—	1,020
† Deptford, Screw Steamer	,,	,,	1,209	—	1,020

Wm. Dobson & Co., Low Walker, Newcastle-on-Tyne.

Ten steel Screw Steamers of a total of 21,227 tons and 15,050 I.H.P.

Messrs. Jos. T. Eltringham & Co., South Shields.

Name of Vessel.	Built of	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
Holzapfel I., Gas Engines, Screw	—	British	293	—	225
Island Prince, Screw	—	,,	205	—	550
Tandanya ,,	—	,,	134	—	550
Olympia ,,	—	Foreign	132	—	600
Overton ,,	—	British	426	–	450
Westdale ,,	—	,,	424	—	450
Huskisson ,,	—	,,	220	–	850
Cecilia ,,	—	Foreign	138	—	600

R. & W. Hawthorn, Leslie & Co., Ltd., Hebburn-on-Tyne.

Name of Vessel.	Built of	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
H.M.S. Nymphe, S. Turbines	—	British	780dis.	—	13,000
Denis, Single Screw	—	,,	4,435	—	2,650
Framlington Court, S. Screw	—	,,	4,153	—	1,800
Pancras, Single Screw	—	,,	4,436	—	2,650
Bosphorus, 67 and 68, Twin Screws	—	Foreign	414ea	—	650ea
Ceylon and Japan, Single Screws	—	,,	5,301ea	—	3,500ea
H.M.S. Jackal, S. Turbines	—	British	780dis.	—	13,000
Nestorian, Single Screw	—	,,	6,400	—	3,060
Ninian, Single Screw	—	,,	6,400	—	3,060
H.M.S. Tigress, S. Turbines	—	,,	780dis.	—	13,500

Hepple & Co., Ltd., South Shields.

Name of Vessel.	Built of	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
† Lydia, Salvage Tug	Steel	Foreign	150	150	600
* Lola, Screw Tug	,,	,,	26	26	160
† Bansara, Twin-Screw	,,	British	128	128	360
* Acima, Screw Tug	,,	Foreign	28	28	130
m Ogarita, Motor Barge	,,	British	95	95	120
m Rose Macrone, Motor Barge	,,	,,	22	22	28

The first four engined by the same Company.

W. P. Huntley, Hebburn.

Name of Vessel.	Built of	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
Defiant, Sailing Vessel	Wood	Newcastle	61	-	—

† Triple. * Compound. *m* Motor.

The Northumberland Shipbuilding Co., Ltd., Howdon-on-Tyne.

Name of Vessel	Built of	Owners	G.T. Regis.	G.T. inclu. erect	I.H.P.
Messina		British	4,[illegible]		2,[illegible]
Hotley		,,	[illegible]		[illegible]
Chiltonian		,,	4,[illegible]		2,[illegible]
Orcland		,,	4,7[illegible]		2,[illegible]
Kinross		,,	4,[illegible]		1,[illegible]
[illegible]		,,	4,[illegible]		2,[illegible]
Dalebank		,,	4,[illegible]		2,000
Cotswold Range, [illegible] and Chiltern Range		,,	4,[illegible] ea		2,20[illegible] ea
[illegible] Court		,,	[illegible]		2,[illegible]
Peebles		,,	4,[illegible]		2,[illegible]
Kangean		Foreign	7,[illegible]		4,10[illegible]

Palmers' Shipbuilding and Iron Co., Ltd., Hebburn and Jarrow-on-Tyne.

Name of Vessel	Built of	Owners	G.T. Regis.	G.T. inclu. erect	I.H.P.
City of Durham, Cargo	Steel	British	[illegible]	—	[illegible]
[illegible], Cargo	,,	Foreign	4,247	—	1,[illegible]
[illegible], Passenger	,,	British	6,[illegible]	—	2,[illegible]
City of Lincoln, Cargo	,,	,,	[illegible]	—	[illegible]
City of Birmingham, Pass.	,,	,,	7,4[illegible]	—	4,440
La Rosarina, Meat & Pass.	,,	,,	[illegible]	—	[illegible]
Also built two Floating Caissons			[illegible]		

In addition to the above, the s.s. Ascania, built by Messrs. Swan, Hunter and Wigham Richardson, Ltd., has been engined, [illegible] I.H.P.

John Readhead & Sons, Ltd., South Shields.

Name of Vessel	Built of	Owners	G.T. Regis.	G.T. inclu. erect	I.H.P.
Daksa	—	Foreign	4,1[illegible]	—	2,[illegible]
Trevorian	—	British	4,[illegible]	—	2,000
Tregurno	—	,,	4,14[illegible]	—	2,000
[illegible]	—	,,	[illegible]	—	1,5[illegible]
Trevalgan	—	,,	4,1[illegible]	—	2,000
Westmoor	—	,,	4,32[illegible]	—	2,[illegible]
Santaren	—	,,	4,2[illegible]	—	2,500
Chevington	—	,,	[illegible]	—	2,000

J. P. Rennoldson & Sons, South Shields.

Name of Vessel	Built of	Owners	G.T. Regis.	G.T. inclu. erect	I.H.P.
* Merman	Steel	British	[illegible]	96	570
* Linesman	,,	,,	[illegible]	96	570
* Tyneside	,,	,,	72	1[illegible]	225
* William Gray	,,	,,	[illegible]	177	910
* Careena	,,	,,	97	2[illegible]	42[illegible]

Smith's Dock Co., Ltd., Middlesbrough.

Name of Vessel	Built of	Owners	G.T. Regis.	G.T. inclu. erect	I.H.P.
[illegible] Vessels			total 11,[illegible]	—	—

Swan, Hunter & Wigham Richardson, Ltd., Wallsend and Walker-on-Tyne.

Name of Vessel	Built of	Owners	G.T. Regis.	G.T. inclu. erect	I.H.P.
Acajutla	—	British	1,1[illegible]	—	1,[illegible]
Admiralty Dock	—	,,	2,[illegible]	—	—
Arabien	—	Foreign	[illegible]	—	2,7[illegible]
Ascania, T.S.	—	British	[illegible]	—	[illegible]
Benguela	—	,,	[illegible]	—	[illegible]
Brisbane	—	Foreign	7,[illegible]	—	4,[illegible]
Ceiba	—	British	2,2[illegible]7	—	2,2[illegible]
City of Lahore	—	,,	7,[illegible]	—	4,[illegible]
City of Poona, T.S.	—	,,	[illegible]	—	4,[illegible]
Corte II.	—	Foreign	1,[illegible]	—	4,20[illegible]
Goldenfels	—	,,	[illegible]	—	[illegible]
Indrapura, T.S.	—	British	1[illegible]	—	6,200
Jabaru	—	,,	2,[illegible]	—	1,[illegible]
Jiquilisco	—	,,	1,[illegible]	—	700
Kina	—	Foreign	6,122	—	2,7[illegible]
Kursk	—	,,	[illegible]	—	[illegible]
Laconia, T.S.	—	British	1[illegible]	—	14,[illegible]
Nascopie	—	,,	2,[illegible]7	—	2,[illegible]
Princess Alice	—	Colonial	[illegible]	—	4,[illegible]
Wiltons Dock	—	Foreign	4,2[illegible]	—	—
Saldanha	—	British	[illegible]	—	2,[illegible]
H.M.S. Sandfly	—	,,	7[illegible]	—	13,[illegible]
Vaigatch	—	Foreign	1,046	—	1,280
Yoro	—	British	2,2[illegible]7	—	2,200

The Tyne Iron Shipbuilding Co., Ltd., Willington Quay-on-Tyne.

Name of Vessel	Built of	Owners	G.T. Regis.	G.T. inclu. erect	I.H.P.
† Bra Kar, Steam Screw	Steel	Foreign	1,7[illegible]1	[illegible]	2,[illegible]
† [illegible], ,,	,,	British	[illegible]7	[illegible]	1,[illegible]
† Ardan, ,,	,,	,,	[illegible]	[illegible]	[illegible]
† Prophet, ,,	,,	,,	[illegible]	[illegible]	1,[illegible]
† Roddam, ,,	,,	,,	[illegible]	[illegible]	1,[illegible]

Wood, Skinner & Co., Ltd., Newcastle-on-Tyne.

Name of Vessel	Built of	Owners	G.T. Regis.	G.T. inclu. erect	I.H.P.
Welbeck, Dumb Hopper Barge	Steel	British	740	—	—
Irk, Dumb Hopper Barge	,,	,,	740	—	—
† [illegible], Steam Screw	,,	Foreign	[illegible],247	—	1,[illegible]
† San Andres, do.	,,	,,	1,[illegible]7	—	1,[illegible]
† San Mateo, do.	,,	,,	1,[illegible]7	—	1,52[illegible]
† South Shields, T.S.	,,	British	244	—	600
† Bangor, Steam Screw	,,	Foreign	[illegible]	—	[illegible]
† Campeiro, T.S.	,,	,,	2,7[illegible]	—	[illegible]

WEAR.

S. P. Austin & Son, Ltd., Sunderland.

Name of Vessel	Built of	Owners	G.T. Regis.	G.T. inclu. erect	I.H.P.
† S.S. Hackwood, Well-deck	Steel	British	1,472	—	1,020
† S.S. Rudmore, Well-deck	—	—	[illegible]	—	970
† S.S. Minster, Single-deck	—	—	2,[illegible]	—	1,[illegible]
† S.S. Paignton, Single-deck	—	—	2,[illegible]	—	1,[illegible]
† S.S. Abbas, Well-deck	—	—	1,4[illegible]	—	1,040
† S.S. Tempo, Well-deck	—	—	1,379	—	1,2[illegible]

* Compound † Triple

Bartram & Sons, Sunderland.

Name of Vessel	Built of	Owners	G.T. Regis.	G.T. inclu. erect	I.H.P.
Lexie, Screw	—	British	3,[illegible]	—	1,[illegible]
Holly Branch, Screw	—	,,	3,[illegible]	—	2,[illegible]
Benlomond, Screw	—	,,	[illegible]	—	[illegible]
Maria, Screw	—	—	[illegible]	—	[illegible]
Cheltenham, Screw	—	,,	[illegible]	—	[illegible]

John Blumer & Co., Sunderland.

Name of Vessel	Built of	Owners	G.T. Regis.	G.T. inclu. erect	I.H.P.
Orangemoor	Steel	British	[illegible]	—	1,[illegible]
Cherbury	,,	,,	[illegible]	—	1,[illegible]
Cornwood	,,	,,	2,[illegible]	—	1,47[illegible]
Marietta N.	,,	Foreign	2,[illegible]	—	1,77[illegible]
Mavisbrook	,,	British	[illegible]	—	1,7[illegible]

John Crown & Sons, Ltd., Strand Slipway, Sunderland.

Name of Vessel	Built of	Owners	G.T. Regis.	G.T. inclu. erect	I.H.P.
Automatic Gas Light Vessel			7[illegible]	—	—
S.S. Porthkerry	—	—	1,[illegible]	—	—
S.S. Wear	—	—	1,[illegible]	—	—
S.S. Ford Castle	—	—	1,[illegible]	—	—
S.S. Arnside	—	—	20[illegible] app	—	—

William Doxford & Sons, Ltd., Sunderland.

Name of Vessel	Built of	Owners	G.T. Regis.	G.T. inclu. erect	I.H.P.
Tellus, Shelter-deck	—	Foreign	—	[illegible],211	2,[illegible]
Carmen, Single-deck	—	,,	—	[illegible]	1,[illegible]
Monkshaven, Single-deck	—	British	—	[illegible],701	1,4[illegible]
Themis, Shelter-deck	—	Foreign	—	[illegible],212	2,[illegible]
Boheme, Single-deck	—	,,	—	[illegible]	1,[illegible]
Orangemoor, Turret-deck	—	British	—	4,42[illegible]	1,[illegible]
Izgled, Single-deck	—	Foreign	—	4,[illegible]	1,[illegible]
Clan Mackenzie, Three-deck	—	British	—	6,21[illegible]	[illegible],7[illegible]
Atna, Shelter-deck	—	Foreign	—	[illegible],71[illegible]	[illegible]
Japanese Prince, Three-deck	—	British	—	6,[illegible]	2,[illegible]
Tysla and Rena, Shelter-deck	—	Foreign	—	[illegible],71[illegible] ea.	[illegible],2[illegible] ea.
Tatna, Single-deck	—	British	—	4,7[illegible]	2,1[illegible]
Carngowan and Carndhu, (Long-bridge)	—	,,	—	4,57[illegible] ea.	1,[illegible] ea.
Clan Macrae and Clan Davidson, Three-deckers	—	,,	—	6,21[illegible] ea.	[illegible],7[illegible] ea.

Sir James Laing & Sons, Ltd., Sunderland.

Name of Vessel	Built of	Owners	G.T. Regis.	G.T. inclu. erect	I.H.P.
Macedonia	—	—	6,[illegible]	—	[illegible]
Rawson	—	—	3,[illegible]	—	2,[illegible]
Detmold	—	—	4,[illegible]	—	1,[illegible]
Mexicano	—	—	[illegible],520	—	2,420

Osbourne, Graham & Co., Hylton, Sunderland.

Name of Vessel	Built of	Owners	G.T. Regis.	G.T. inclu. erect	I.H.P.
† Armora, Steam	Steel	British	1,[illegible]	—	1,2[illegible]
† Gabrielle	,,	Foreign	1,477	—	1,[illegible]
† Edenor	,,	,,	1,4[illegible]	—	7[illegible]
† Petrel	,,	,,	[illegible]	—	4[illegible]
† Hyltonia	,,	British	1,[illegible]2	—	1,1[illegible]
† I[illegible]	,,	,,	[illegible]7	—	[illegible]
† Marguerite	,,	Foreign	1,6[illegible]	—	1,140

W. Pickersgill & Sons, Sunderland.

Name of Vessel	Built of	Owners	G.T. Regis.	G.T. inclu. erect	I.H.P.
Intent	—	British	1,[illegible]		
Carisa	—	Foreign	2,[illegible]	—	—
Erlesburgh	—	British	[illegible]	—	
Electra	—	Foreign	[illegible]		

John Priestman & Co., Sunderland.

Name of Vessel	Built of	Owners	G.T. Regis.	G.T. inclu. erect	I.H.P.
† Saracen, Screw	Steel	British	[illegible],272	—	1,[illegible]
† Takasan Maru, Screw	,,	Foreign	2,[illegible]	—	1,[illegible]
† [illegible], Screw	,,	,,	[illegible]	—	1,[illegible]
† Fluent, Screw	,,	British	[illegible]	—	1,[illegible]
† Yi Loong, Screw	,,	,,	1,[illegible]30	—	1,[illegible]

Short Brothers, Ltd., Sunderland.

Name of Vessel	Built of	Owners	G.T. Regis.	G.T. inclu. erect	I.H.P.
Burmese Prince	—	British	6,1[illegible]	—	[illegible],120
Lissa	—	,,	4,[illegible]2	—	2,12[illegible]
Chinese Prince	—	,,	6,1[illegible]	—	[illegible]7
Thornhill	—	,,	4,2[illegible]	—	2,[illegible]
Wabana	—	,,	[illegible]	—	2,[illegible]
Maskinonge	—	,,	[illegible]	—	2,[illegible]

Sunderland Shipbuilding Co., Ltd., Sunderland.

Name of Vessel	Built of	Owners	G.T. Regis.	G.T. inclu. erect	I.H.P.
Daphne	Steel	British	1,[illegible]	—	1,17[illegible]
Walter Dammeyer	,,	,,	[illegible]	—	7[illegible]
Bretwalda	,,	,,	4,036	—	2,040
Siamese Prince	,,	,,	[illegible]	—	[illegible]
Yorkton	,,	,,	[illegible]	—	[illegible]
[illegible]	,,	,,	2,[illegible]	—	1,[illegible]
[illegible]	,,	,,	4,[illegible]	—	2,[illegible]

Joseph L. Thompson & Sons Ltd., Sunderland.

Name of Vessel	Built of	Owners	G.T. Regis.	G.T. inclu. erect	I.H.P.
Terrier	Steel	Foreign	—	[illegible],672	2,[illegible]
Manningtry	,,	British	—	4,4[illegible]	2,[illegible]
Birchfield	,,	,,	—	4,[illegible]	2,2[illegible]
Tenpaisan Maru	,,	Foreign	—	[illegible],414	2,[illegible]
Foylemore	,,	British	—	[illegible]	2,[illegible]
Cento	,,	,,	—	4,[illegible]77	[illegible]
Zinal	,,	,,	—	[illegible]	[illegible]
Arab	,,	,,	—	[illegible]	[illegible]
Northern	,,	,,	—	5,977	2,730

Robert Thompson & Sons, Ltd., Southwick Yard, Sunderland.

Name of Vessel	Built of	Owners	G.T. Regis.	G.T. inclu. erect	I.H.P.
tc Mary [illegible]	Steel screw	British	[illegible]	[illegible]	[illegible]
† [illegible]	,,	,,	[illegible]	[illegible]	[illegible]
tc [illegible]	,,	,,	[illegible]	[illegible]	[illegible]
tc [illegible]	,,	Foreign	[illegible]	[illegible]	[illegible]
tc Horngarth	,,	British	[illegible]	[illegible]	[illegible]
tc Dalewood	,,	,,	2,42[illegible]	2,[illegible]	1,[illegible]

† Triple *tc* Tri-compound

TEES & HARTLEPOOLS.

Craig, Taylor & Co., Ltd., Stockton-on-Tees.

Name of Vessel.	Built of	Owners	G.T. Regis.	G.T. inclu. erect.	I.H.P.
Amens, S.S., Single Deck		British	4,1[illegible]		2,940
Exford, S.S., Single Deck..		,,	4,776		2,245
Egremont Castle, S.S., 2 decks		,,	5,471		3,200
Maryland, S.S., Single Deck		,,	2,712		1,400
Wimborne, S.S., Single Deck		,,	6,989		2,880
† Windsor, S.S., Single Deck		,,	6,989		2,880

Sir Raylton Dixon & Co., Ltd., Middlesbrough-on-Tees.

Vendee	Steam Steel	British	1,2[illegible]	1,450	1,580
Vosges .. .. ,, ,,		,,	1,295	1,950	1,580
Halvdan	,,	Foreign	3,907	4,910	2,220
Kinkasan Maru	,,	,,	4,943	5,820	2,600
Henrik	,,	,,	3,915	4,920	2,220
Rokkosan Maru	,,	,,	2,020	2,280	1,500
Imataka	,,	British	1,776	2,360	1,950
Mefea	,,	,,	3,552	3,730	2,440
Graceful	,,	,,	1,149	1,720	1,100
Lugan	,,	,,	4,677	5,100	2,500
Saltburn	,,	,,	1,830	2,100	1,000
Hochelaga	,,	,,	4,677	5,100	2,500
Hooton	,,	,,	1,750	1,900	1,300

W. Gray & Co., Ltd., West Hartlepool.

Langholm		British	3,487		1,760
August		Foreign	6,281		2,740
Arna		,,	6,273		2,740
Hans B.		,,	4,698		2,040
Armanistan		British	3,819		2,330
Telemachos		Foreign	4,348		1,680
Brooklet		British	3,712		1,670
Harpalyce		,,	6,476		3,700
Crangston		,,	2,810	-	1,340
Otto Trechmann..		,,	4,698	-	2,020
Normanby		,,	3,616	-	2,360
Roselands		,,	4,797	-	2,420
Gorgistan		,,	3,682	-	3,630
Penhale		,,	4,131		1,800
Daybreak		,,	3,697		1,740
Turkistan		,,	5,038		3,830
Robert Coverdale		,,	4,129		1,800
Ruysdael		,,	3,818	-	1,500

Wm. Harkess & Sons, Ltd., Middlesbrough.

Andalusian	Steel Screw	British	2,349	—	1,450
Gaythorn, Dumb Hopper Barge	—	,,	757	-	—
Deighton, Dumb Hopper Barge	—	,,	757	—	—
† Levenwood and Eskwood	Steel Screws	,,	791ea		800ea
† Hampshire Coast ..	,,	,,	787	—	750
† Leon y Castillo	,,	Foreign	885	—	850

Irvine's Shipbuilding and Dry Dock Co., Ltd., West Hartlepool.

Argentine Transport, American Transport, and Australian Transport, Screw Steamers		British	- -	3,350ea	2,000ea
Koophandel, Screw Steamer	—	Foreign	—	2,150	1,000
Clan Macphee, Screw Steamer	-	British	—	6,670	4,000
Zevenbergen, Screw Steamer	-	Foreign	- -	3,425	1,600
Brierton, Screw Steamer ..		British		3,750	1,850
Glenbridge and Glendene, Screw Steamers	—	,,	-	4,450ea	1,800ea
El Paraguayo, Twin-Screw Steamer (Frozen and Chilled Meat)	—	,,	—	10,250	6,000
Nigaristan, Screw Steamer	—	,,	-	5,055	3,830
Cotovia, Screw Steamer .	—	,,		4,720	2,000
Vryhandel and Ubbergen, Screw Steamers	- -	Foreign	—	2,250ea	1,000ea
Cadmus, Screw Steamer ..	—	British	-	2,150	1,000
South Point Screw Steamer	-	,,	-	5,200	2,300

Richardson, Duck & Co., Stockton-on-Tees.

Dorie .. Steamer	-	British	—	3,609	1,800
Budapest		Foreign	-	3,773	1,800
Fiume ..		,,	-	3,774	1,800
Braunton		British	-	5,069	2,650
Barrowmore .		,,		4,267	2,340
Cloughton	-	,,		5,573	2,500
Tavian, Isherwood system . ..		,,		5,835	2,450
* Jessmore do.		,,		4,344	2,340

Ropner & Sons, Ltd., Stockton-on-Tees.

Grantoun . . . Steel		British	6,041		2,650
* Blackheath		,,	5,310		2,600
* Isleworth		,,	5,321	-	2,900
† Hopper No. 1		,,	1,125	-	1,500
* Hoppers Nos. 17 and 18 .			1,127ea		1,500ea
† Scawby			4,012		1,950
† Hoppers Nos. 19, 20, 21 and 22 .		,,	1,127ea	-	1,500ea

* Compound. † Triple.

HUMBER.

Cochrane & Sons, Selby.

Name of Vessel	Built of	Owners	G.T. Regis	G.T. inclu. erect.	I.H.P.
Wallington, Trawler ..		British	289		500
Yesso, Trawler		,,	229		400
Beru, Trawler . .		,,	195		425
Phronius, Trawler .. .		,,	288		540
Neil Gow and Persimon, Trawlers		,,	255ea		475ea
Vonolel, Trawler		,,	263		500
Oreades and Lycerta, Trawlers		,,	269ea		400ea
Wengeha and Xylopia, Trawlers		,,	261ea		400ea
Cayman, Trawler		,,	216		400
Princeps, Trawler		,,	263	-	500
Lord Salisbury and Michael Angelo Trawlers		,,	284ea	-	500ea
Lord Knollys, Trawler		,,	284		500
Paramount, Drifter		,,	94		225
Chalcedony and Aquamarine, Trawlers		,,	338ea		580ea
Kent County, Drifter ..		,,	85		180
E.W.B., Drifter		,,	94		225
Drypool, Trawler . ..		,,	330		520
Sutton, Trawler		,,	332	-	550
Faci, Marakchi and Meknassi, Steamers	-	Foreign	184ea	-	400ea
Lord Haldane, Drifter ..		British	91	—	175
Lord Wenlock, Drifter ..		,,	91	—	175
Eccleshill, Emley and Epworth Fleeters		,,	225ea	—	260ea
Skuli Fogeti, Trawler ..		Foreign	285	—	500
Beacon Star, Drifter ..	-	British	98	-	200
Constant Star, Drifter ..		,,	98	—	200
Elysian, Trawler..	-	,,	216		400
Manx Admiral, Trawler ..	-	,,	220	-	425
Alnmouth, Trawler	-	,,	225	-	425
Baldur and Bragi, Trawlers..		Foreign	310ea	-	520ea

Cook, Welton & Gemmell, Ltd., Beverley.

† Cambodia, Escallonia and Freesia, Steam Trawlers..	Steel	British	284ea		550ea
† Christopher, Steam Trawler	,,	,,	318	—	550
† Dane, Norman and Imperialist, Steam Trawlers ..	,,	,,	345ea		580ea
† Croxby, Garu, Bardolph and Caliban, Steam Trawlers	,,	,,	214ea		450ea
† Night Hawk, Steam Trawler	,,	,,	287	—	530
† Jacamar and Houbara, Steam Trawlers	,,	,,	292ea	- -	550ea
† Athelstan and Parthian, Steam Trawlers	,,	,,	201ea	—	400ea
† Pamela and Schipperke, Steam Trawlers	,,	,,	331ea	—	550ea
† Mackenzie and St. Malo, Steam Trawlers	,,	,,	335ea	—	550ea
† De La Pole, Steam Trawler	,,	,,	254	- -	450
† Myna, Steam Trawler ..	,,	,,	333	-	550
† Stronsay, Westray and Rowsay, Steam Trawlers ..		,,	207ea	—	250ea
† Ralco and Responso Steam Trawlers		,,	229ea	—	450ea
† Recolo, Steam Trawler ..	,,	,,	175	—	375

Earle's Shipbuilding & Engineering Co., Ltd., Hull.

Admiralty Yard Craft, No. 95	-	British	190	—	300
Castro and Hydro (Hulls only)	—	,,	1,500ea	—	—
Bayardo	-	,,	3,000	—	3,750
Stockport	-	,,	1,700	—	1,000
Harrogate	-	,,	1,390	—	1,[illegible]0
Borodino	—	,,	2,710	- -	2,090
Montebello		,,	4,800	—	2,280
Gourko	—	,,	2,710	—	2,090

I.H.P. of machinery for renewals and ships built elsewhere, 12,750.

The Goole Shipbuilding and Repairing Co., Ltd., and Associated Firm The Dundee Shipbuilding Co., Ltd.

Lucida and Kilda, Screw Trawlers		British	244ea		485ea
Oran, Screw Steamer ..		Foreign	473	-	480
Larrea and Lamport, Salvage Tugs		,,	132ea		550ea
Moreno and Alvear, Salvage Tugs		,,	205ea	—	880ea
Duster and Flicker, Screw Fleeters		British	193ea		390ea
Trent, Screw Steamer ..		,,	534		450
New Abbotshall, Screw Str.	—	,,	900	—	1,100
Humaitá, Passenger Paddle Steamer	-	Foreign	457	-	430
Guanabara, Screw Steamer		,,	324		550
Baleares, Steel Schooner ..		,,	650		—
Canarias and Filipinas, Steel Schooners	-	,,	651ea	-	
Antillas, Steel Schooner ..	—	,,	652	-	-
Porvenir, Passenger Paddle Steamer	-	,,	1,085	—	1,100
14 Barges, for shipment ..	—	,,	980	—	—

In addition to building the above vessels the firms have also done a large amount of repair work to both hull and engines of Government and merchant vessels, including the cruiser Hebe.

† Triple.

Henry Scarr, Hessle, nr. Hull.

Name of Vessel	Built of	Owners	G.T. Regis.	G.T. inclu. erect	I.H.P.
Leeds Axis, Towing Barge	Steel	British	[illegible]	—	—
Fire Queen, Twin-screw Fire Float			90	—	90
Cissa, Steam Tug	—	—	60	—	75
Humber, Trent and Ouse Towing Barges	—	—	2000a		
St. Andrew, Steam Barge	—	—	20		20
Six, Steam Barge	—	—	200		75
Waterloo, No. [illegible], Towing Barge	—	—	240	—	—
No. [illegible], Steam Waterboat	—	—	[illegible]	—	—

Joseph Scarr & Sons, Beverley.

4 Towing Lighters	—	British	740	—	—
Commander, Steam Keel	—	—	200	—	—
No. 286, Towing Lighter ..	—	,,	220		
2 Keel	—	—	270		
Atlantic, Towing Lighter	—	—	[illegible]	—	—

W. H. Warren, New Holland, Lincs.

10 Steel Lighters	Steel	British	170		—
‡‡Clara, Tug ..	—	—	108	—	—

THAMES.

Beaching Bros., Ltd., Great Yarmouth.

Name of Vessel	Built of	Owners	G.T. Regis.	G.T. inclu. erect	I.H.P.
* 8 Steam Drifters	—	British total	400	—	total 1,770
1 Steam Drifter	—	,,	90	—	

John Chambers, Lowestoft.

* Lily Maud	Steam Wood	British	72		130
* David B. Summers	—	—	61		120
* Heather Bloom, *Lily Jane, *Nesmar, *Sarah Marian, *Girl Norah, *Reality, *Evening Primrose	—	total	87	—	total 1,180
Tessie	—	—	57	—	200
* Gleam, *Hope	—	—	72	—	150
† Hall Moon	—	—	74	—	200
* Golden Gem, *Silver Herring, *Boy Harold, *Young Man	—	total	[illegible]	—	total 660
* Ocean Crest	—	—	57	—	200
* Dusty Miller	—	—	72		150
* Nevertheless	—	—	57		200
† Saint Pierre	Sail	Foreign	74		
* Lord Dunwich, *Herring Seeker, *Two Boys, *Boy Roy	Steam	British total	[illegible]	—	total 660

Crabtree & Co., Ltd., Great Yarmouth.

Buckler, Present Help and Acceptable herring drifters	Steel	British	5[illegible]a	—	150a
Lark and Shipmates herring drifters	—	—	5[illegible]a	—	150a
Merry Spinner and G.M.H., herring drifters	—	—	52a	—	150a

Edwards & Co., Ltd., Millwall, London.

No. [illegible], Crane Barge	—	—	65	—	—
No. [illegible], Dredger	—	—	60	—	—
No. [illegible], Motor Lifeboat	—	—	1	—	75 B.H.P.
No. [illegible], Lighter	—	—	[illegible]	—	—
No. [illegible] and [illegible] Barges	—	—	[illegible]	—	—
† Palenata, Launch	—	—	4	—	7
No. [illegible], Paddle Yacht	—	—	70	—	225
‡‡Lilian, T.S. Cargo Steamer	—	—	110	—	[illegible]
Nos. [illegible], [illegible] and [illegible] Barges	—	—	192	—	—
No. [illegible], Oil Tank Barge	—	—	2[illegible]	—	—
No. [illegible], Barge	—	—	[illegible]	—	—

Fellows & Co., Ltd., Great Yarmouth.

Talbot, screw tug	Steel	British	50	—	—
Archimedes, steam drifter	Wood	—	52	—	—
Fenrew, steam drifter	—	—	54	—	—
Girl Ethel, steam drifter	—	—	[illegible]	—	—
Speranza, steam drifter	—	—	8	—	—
B.T.B., steam drifter	—	—	5[illegible]	—	—

Forrestt & Co., Ltd., Wyvenhoe.

4 Stern Wheel Steamers	Steel	Foreign	772		1,018
2 Lighters	Comp.	—	66		—
1 Mooring Lighter	Steel	British	264		—
4 Barges, 2 Wood, 1 Steel	—	Brit. & F.	1[illegible]		400
Steel Bridge-craft	—	Foreign	1		—
Canoes, Cargo Launches, Pinnaces			24		—

Edward Hayes, Stony Stratford.

‡‡Engine, single screw	Steel plate	Foreign	22	22	70
‡‡Passenger Launch, single screw			26	26	75
‡‡Tug, single screw			2[illegible]	2[illegible]	72
‡‡Tug, twin screw			2[illegible]	2[illegible]	[illegible]

All the machinery for the above vessels was built by Mr. Hayes.

G. Rennie & Co., Greenwich.

Name of Vessel	Built of	Owners	G.T. Regis.	G.T. inclu. erect	I.H.P.
Melinhawk, III, auxiliary yacht	—	British	[illegible]	—	—
4 T.S. Shallow Draught Launches	—	Foreign	[illegible]	—	[illegible]
Birchams, single screw passenger vessel	—	—	[illegible]	—	[illegible]
Eclipse, motor barge	—	British	[illegible]	—	14
2 Screw Tugs	—	—	total [illegible]	total	—
No. 1166, Twin-screw tug	—	Foreign	[illegible]	—	[illegible]
No. 1170, Screw tug launch	—	—	[illegible]	—	14
No. 1166, Dredger	—	British	[illegible]	—	—
Dredger	—	Foreign total	[illegible]	—	—
6 Barges	—	—	[illegible]	—	—
2 Barges	—	British	[illegible]	—	—
No. 1148, Sailing boat	—	Foreign	[illegible]	—	—
2 Lighters	—	— total	[illegible]	—	—
Lighters	—	—	[illegible]	—	—
2 Barges	—	British	[illegible]	—	—

A. W. Robertson & Co., Lea Shipbuilding Yard, Canning Town.

S.S. Spread Eagle	Steam	British	144	—	—
T.S.S. Edith	—	—	280	—	—
6 Lighters	Sail	Foreign	[illegible]	—	—
10 Lighters	—	British	[illegible]	—	—

H. Shrubsall, E. Greenwich.

Valenia	Sail Wood	British	130	—	—

Thames Ironworks Shipbuilding and Engineering Co., Ltd., Canning Town.

H.M.S. Thunderer, 1st-class Battleship, displ. tons 22,500, and 12 small craft, totalling 70 tons.

ENGLISH CHANNEL.

Camper & Nicholson, Ltd., Gosport.

Name of Vessel	Built of	Owners	G.T. Regis.	G.T. inclu. erect	I.H.P.
m Adhara, twin motor yacht	Wood	Foreign	[illegible]		[illegible]
Norada, racing yacht ..	Composite	British	[illegible]		—
Termagant, racing yacht	Wood		7		—
m Ainauia, motor boat for missionary service in New Guinea	Wood	—	7		[illegible]
* Marynthea, twin-screw steam yacht	Steel	British	[illegible]		[illegible]
m Launches, motor	Wood		[illegible]		—

x This vessel built in connection with Messrs. J. I. Thornycroft, Southampton.

J. C. Fay & Co., Ltd., Southampton.

Grampus, yawl yacht ..	Wood		—		—
Nelta, cutter yacht			—		—
Verbena, cutter yacht			—		—

Philip & Son, Ltd., Dartmouth.

Admiralty Pinnace	Sail Wood	British	[illegible]		—
,, ,,	,, ,,	,,	8	—	—
,, ,,	Steam	,,	1[illegible]	—	[illegible]
,, ,,	—	—	1[illegible]		[illegible]
‡ Admiralty Launches ..			[illegible]		[illegible]
Coco Coto	Steel	Foreign	18		[illegible]
Start Bay	—	British	11		14
Leon	—	Foreign	14		—

Engines by same firm.

Simpson, Strickland & Co., Ltd., Dartmouth.

‡‡No. 706, Navy pinnace			12		[illegible]
Nos. 780 and 781, Yacht's cutters			[illegible]		—
Nos. 782 and 783, Yacht's dinghies			[illegible]	—	—
a No. 784, Yacht's launch	—	—	[illegible]		—
‡‡No. 785, Harbour launch	—	Valen	[illegible]		17
† No. 770, Yacht's launch	—	—	2		[illegible]
No. 771, Yacht's gig	—	—	2		—
‡‡No. 772, Steam launch	—	—	[illegible]		—
† No. 773, Yacht's launch	—	—	2	—	—
† No. 774, Yacht's launch	—	—	[illegible]	—	2
‡‡No. 775, Navy pinnace	—	—	4	—	[illegible]
‡‡No. 777, Navy cutter	—	—	4	—	27
‡‡No. 778, Ship's launch	—	—	[illegible]	—	—
No. 779, Navy launch	—	—	2	—	—
m No. 779, Navy launch	—	—	[illegible]	—	—
m No. 777, Harbour launch	—	—	2	—	[illegible]
† No. 778, Pleasure launch	—	—	2	—	[illegible]
‡‡No. 779, Pleasure launch	—	—	7	—	—
† No. 781, Pleasure launch	—	—	[illegible]	—	—
† No. 782, Ship's launch	—	—	[illegible]	—	[illegible]
† No. 783, Ship's launch	—	—	1	—	—
m No. 784, River launch	—	—	2	—	—
			Over [illegible]		[illegible]
			Machinery [illegible]		[illegible]
			Total I.H.P.		[illegible]

* Compound. † Triple. ‡ Compound Non-Condensing.
‡‡ Compound Surface Condensing.

‡‡ Compound Surface Condensing. [illegible]
* [illegible] Compound. † Triple.

G. & T. Smith, Ltd., Rye, Sussex.

Name of Vessel	Built of	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
C.A.C. North Sea trawler	Soil Wood	British	—	—	—
Decision North Sea trawler	..	..	54	—	—
Felesia North Sea trawler	..	..	59	—	—

Stow & Sons, Shoreham.

Otter, sailing yacht, with aux. motor	Wood	Foreign	1	-	12

John I. Thornycroft & Co., Ltd., Southampton.

H.M.S. Minstrel	Steel		615	—	13,500
H.M.S. Achates	,,		725	—	15,000
H.M.S. Ariel	,,		725		15,000
S.Y. Marantha			1,021		1,700
Coal Barge	,,		30		—
Stern Wheel Steamer	,,		87		350
10 Motor Patrol Launches	Wood		300	—	1,500
Oil Barge	Steel	—	25		—
Motor Launch	Wood	—	5		30
3 Motor Patrol Launches	,,	—	90		450
3 Motor Patrol Launches	Steel	—	90		450
4 Motor Patrol Launches	,,	—	120		600
Oil Barge	,,	—	60	-	-
Steam Tug, Catherine Lawrence	,,	—	97	—	450
Steam Tug, Alida Harvey	,,	—	83		450
Stern Wheel Steamer	,,	—	16	—	50
Lighters	,,	—	70		—
Lighter	,,		88		—

J. Samuel White & Co., Ltd., Cowes, I. of W.

Torpedo Boat Destroyers, Shallow Draught Vessels for Special Service, Special Steam Boats for War-ships	—	British and Foreign Governments	2,627	—	37,195

W. White & Sons, Cowes, I. of W.

* 50 ft. Admiralty Pinnace, No. 187	Wood	British	13	—	141
* Dorothy, Lifeboat		,,	35	—	144
* Snipe, Steam Launch	,,	,,	5	—	31

J. White, East Cowes.

m Armorel IV. (Classes Lloyd's A 1.)	Wood	British	48	27	25

BRISTOL CHANNEL.

Isaac J. Abdella & Mitchell, Ltd., Brimscombe, Stroud.

Name of Vessel	Built of	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
5 Motor Boats	—	Foreign	—	—	39
2 Lighters	—	,,	64ea	—	—
1 Hull	—	,,	—	—	40
2 Dinghies	—	—	-	—	—
15 other Boats	—	Foreign total 153		— total 698	

All engined by the same Company

Edward Finch & Co., Ltd., Chepstow.

8 Lighters, 30 ft. by 16 ft. by 7 ft.
2 150-ton Lighters, 90 ft. by 23 ft. by 7 ft.
2 300-ton Lighters, 115 ft. by 28 ft. by 6 ft. 3 in.
2 200-ton Lighters, 88 ft. by 24 ft. by 7 ft.
2 Lighters, 90 ft. by 22 ft. by 7 ft.

C. H. Walker & Co., Ltd., Sudbrook, nr. Chepstow, Mon.

Pontoon Sheers Hull	Towing Steel		Foreign	171	—	—
Coaster	Steam	,,	British	202	—	230
Dumb Hopper	Towing	,,	..	81	—	—
Cargo Steamer	Steam	,,	Foreign	613	—	440
Lighter	Towing	,,	British	59	—	—
Lighter	,,	,,	,,	59	—	—
Crane Pontoon	,,	,,	Foreign	275	—	-
Tug	Steam	,,	..	113	-	440

MERSEY.

Isaac J. Abdella & Mitchell Ltd., Chester.

Name of Vessel.	Built of	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
* Laura, Tug	Steel	Foreign	—	—	100
Coal, Lighter	,,	British	150	—	--
Oyster	,,	,,	—	—	—
Sole		,,	..	—	—
Plaice ,,	,,	,,	..	—	—
Lobao, Twin-Screw Passenger Steamer	-	Foreign	450	—	
4 Launches	--	..	564	—	—

Engines by the same Company

* Compound. m Motor.

Cammell, Laird & Co., Ltd., Birkenhead and Tranmere.

Name of Vessel.	Built of	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
Montenegro, Amazon Steamer, Screw	Steel	Foreign	450		62
t San Luis, Santa Fe, Santiago and Tucuman, T.B. Destroyers	,,	,,	890ea		20,000ea
Francisco Sallos, Stern-wheeler, Paddle	,,	,,	240		387
Adamant and Alecto, H.M. Tenders for Depot Ships, Screw		British	830ea	-	1,400ea
t Lapwing and Lizard, T.B. Destroyers	,,	,,	dis.780ea	-	13,500ea
Westbourne, Screw Tug	,,	,,	160		500
Highland Loch and Highland Piper, Chilled Meat Carriers, Screw	,,	,,	7,500ea	-	4,400ea
Chenab, Indian Emigrant Steamer	,,	,,	3,550	-	2,200

And 42 Lighters for shipment with a tonnage of 1,004

Isaac Pimblott & Sons, Northwich.

3 Lighters	Steel	Foreign	est.52ea	—	—
Lighter	Comp.	,,	33	--	—
Lighter	Steel	,,	60	—	—
* Launch	,,	,,	6	-	22
3 Lighters	,,	,,	32		-
* Launch	,,	,,	14	-	35
3 Lighters	,,	,,	60ea	--	-
Motor Barge	,,	,,	17	40b.h.p.	—
Lighter	,,	,,	8	-	-
Barge	,,	,,	52	--	—
* 2 Launches	,,	,,	27ea	70ea	—
* 2 Launches	,,	,,	6ea	22ea	—
Lighter	,,	,,	35	—	—
Barge	,,	British	65	—	—

Vickers Limited, Barrow.

H.M.S. Princess Royal	—	British Gov.	—	—
H.M.S. Dartmouth		,,		
H.M.S. Phœnix		,,		
Chinese Cruiser "Ying Swei"		Chinese Gov.		
Floating Dock		Aberdeen Harbour Commissioners		
Tug, Sir Hugh Allah		Montreal Harbour Commissioners		
Various Small Vessels.				

Total Tonnage .. 49,960. Total I.H.P. .. 121,000

W. Walker, Maryport.

* Zeiteh	Steel	British	-	291	—

R. Williamson & Sons, Workington.

† Volhynia	Steel	British	617	-	-
* Wythburn	,,	,,	420		

Steel Towing Lighter, 600 tons cargo.

W. J. Yarwood & Sons, Northwich, Cheshire.

Nos. 156 and 157, Barges	Steel	British	370	—	—
* Nos. 159 and 160, Steam Launches	,,	Foreign	86	-	100
m No. 162, Motor Barge	-	British	150	—	90
* No. 163, Screw Steamer	Steel	,,	130	—	125
* Nos. 164, 165, and 169, Steam Launches	,,	Foreign	80		127
No. 170, Barge	Wood	British	80	—	—
Nos. 173, 174 and 175, Steam Launches	Steel	Foreign	85	—	130

Engines by the same firm.

THE RIBBLE.

Lytham Shipbuilding and Engineering Co., Lytham.

Name of Vessel.	Built of	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
‡‡Rio Aripuana, Passenger and Cargo Steamer	Steel	Foreign	207	—	320
Nos. 427/428, 2 Towing Lighters	,,		110ea	—	—
‡‡Richard Lander, Stern-wheel Passenger and Cargo Steamer	,,	British	339	—	450
† Beni, Passenger and Cargo Steamer	,,	Foreign	469	—	800
Nos. 431/432, 2 Towing Lighters	,,	-	110ea	--	—
‡‡Munshi, Twin-screw Cargo and Tug	,,	British	177	—	500
‡‡Nigretia, Single-screw Launch	,,	,,	60	—	160
Nos. 435/40, 6 Steel Poling Canoes	,,	—	abt.20ea	—	—
f Lahat, Stern-wheel Steamer	,,	—	60	—	100
† Rozinho, Passenger and Cargo Steamer	,,	Foreign	225	—	360
f Beliti, Stern-wheel Steamer	,,	—	60	—	100
f Kwilu, Single-screw Launch	,,		45		105
No. 447, 1 Steel Poling Canoe	,,	--	10	-	-

t Turbine. * Compound. † Triple. m Motor.
‡‡ Compound Surface Condensing.
f Compound Non-Condensing.

ROYAL DOCKYARDS.

H.M. Dockyard, Chatham.

Name of Vessel.	Built at	Owners	G.T. Regis	G.I. indicated	I.H.P.
Chatham, Cruiser	—	—	—	—	—
D 7 and D 8, Submarines	—	—	—	—	—

H.M. Dockyard, Devonport.

H.M.S. Centurion laid down and launched, displ. 25,000.
H.M.S. Lion completed.

H.M. Dockyard, Pembroke.

‡ H.M.S. Active	Steel		14 dis	18,000
‡ H.M.S. Amphion			14 dis	18,000

LIST OF VESSELS ENGINED IN 1911.

Amos & Smith, Ltd., Hull.

Name of Vessel.	Builders	I.H.P.	Press. lbs.
Castro and Hydro	Earle's Shipbuilding and Engineering Co., Ltd.	578ea	—
Tinto	Dundee Shipbuilding Co., Ltd.	650	—
N.E.R. No. 14	Blyth Shipbuilding and Dry Dock Co., Ltd.	650	
D.D., D.D.S. and D.D.S.	Foreign	1400ea	—
Christopher	Cook, Welton & Gemmell, Ltd.	570	—
Dane, Norman and Imperialist	,, ,,	600ea	—
Barbell and Caliban		280ea	
Pamela and Schipperke		560ea	—
Dela Pole		450	—
Yesso	Cochrane & Sons	440	—
Phronis	,, ,,	510	—
Orcades and Lacerta	,, ,,	4300ea	—
Chalcedony	,, ,,	640	—
Aquamarine	,, ,,	640	—
Drypool	,, ,,	420	
Fiat, Marakehi and Meknassi	,, ,,	440ea	—
Eccleshill and Emley	,,	200ea	—
	Total	13,440	

Baird Bros., North Shields.

† South Shields, Vehicular Ferry, Twin Screw Coaster	Wood, Skinner & Co.	600	160
* Overton and Westdale, Single Screw Coasters	Jos. T. Eltringham	500ea	130e
	Total	[illegible]	

Blair & Co., Ltd., Stockton-on-Tees.

S.S.'s Levenpool and Grainton	Ropner & Sons, Ltd.	[illegible]	—
S.S. Terrier	J. L. Thompson & Sons	[illegible]	
S.S. Dorie	Richardson, Duck & Co.	1,800	
S.S.'s Budapest and Fiume	Richardson, Duck & Co.	1,800ea	
S.S. Grosf Khuen Hedervary	Armstrong, Whitworth & Co.	[illegible]	
S.S. Hunnia	Wood, Skinner & Co.	[illegible]	
S.S. Framlington Court	Hawthorn, Leslie & Co.	[illegible]	
S.S. Garesfield	Robt. Thompson & Sons	[illegible]	
S.S. Porthkerry	John Crown & Sons	[illegible]	
S.S. Atlantica	Armstrong, Whitworth & Co.	[illegible]	
S.S. Takcasan Maru	Priestman & Co.	[illegible]	
S.S. Blackheath	Ropner & Sons	[illegible]	
S.S. Kinkasan Maru	Sir Raylton Dixon & Co.	2,600	—
S.S. Braunton	Richardson, Duck & Co.	[illegible]	
S.S. Tenguisan Maru	J. L. Thompson & Sons	[illegible]	
S.S. Levenwood	Wm. Harkess & Son	[illegible]	
S.S. Rokkosan Maru	Sir Raylton Dixon & Co.	[illegible]	
S.S. Isleworth	Ropner & Sons	[illegible]	
Hopper Barge, No. 16	,, ,,	[illegible]	
S.S. Eskwood	Wm. Harkess & Son	[illegible]	
S.S. Imataka	Sir Raylton Dixon & Co.	[illegible]	
Hopper Barge, No. 17	Ropner & Sons	[illegible]	
,, ,, No. 18	,, ,,	[illegible]	
,, ,, No. 19	,, ,,	[illegible]	
S.S. Egremont Castle	Craig, Taylor & Co.	[illegible]	
S.S. Cloughton	Richardson, Duck & Co.	[illegible]	
S.S. Upcommen	Eastbourne Co., Lytham	[illegible]	
S.S. Winterton	Craig, Taylor & Co.	[illegible]	
Hopper Barge, No. 20	Ropner & Sons	[illegible]	
S.S. Zinal	J. L. Thompson & Sons	[illegible]	
S.S. Horngarth	Robt. Thompson & Sons	[illegible]	
S.S. Scawby	Ropner & Sons	[illegible]	
Hopper Barge, No. 21	,, ,,	[illegible]	
	Total	[illegible]	
S.S. Bull, New Boilers Old Steamer		[illegible]	
S.Y. Marynthea Boilers only, Campbell & Nicholson		[illegible]	
	Total	[illegible]	
In addition [illegible] new boilers have been built for tugs, trawlers and donkey boilers purposes having an aggregate I.H.P. of [illegible]		[illegible]	
	Total for the year	[illegible]	

* Compound. † Triple.

Central Marine Engine Works, West Hartlepool.

Name of Vessel	Builder	I.H.P.	Press. lbs.
* Longholm	[illegible]	[illegible]	—
* Angmet and Arica	Foreign	[illegible]	—
* Hans B	,,	[illegible]	
* Armanistan	British	[illegible]	
† Hilmacher	Foreign	[illegible]	
† Brooklet	British	[illegible]	
* Harrabyce	,,	[illegible]	
† Crangton	,,	[illegible]	
* Otto Freckmann	,,	[illegible]	
* Normanby	,,	[illegible]	
† Rockhants	,,	[illegible]	
* Gorgetan	,,	[illegible]	
† Penhale	,,	[illegible]	
* Daybreak	,,	[illegible]	—
† Turkistan	,,	[illegible]	—
† Robert Coverdale	,,	[illegible]	
* Ruysdael	,,	[illegible]	
		Total 41,360	

George Clark, Ltd., Sunderland.

S.S.'s Intent, Helvetia, Kamouraska, Wabana, Rodmoor, Saracen, Lissa, Burmese Prince, Thornhill, Mercedes, Carina, Bayleaf, Lord Weir, Arab, Tempo, Wear, Dalmeld, Jesmond, Hoxton, Crawford, Deptford, No. 173. Total, 22 engines.

	I.H.P.
Total Nominal Horse Power by Lloyd's Rule	7,550
Estimated Indicated Horse Power	[illegible]

Crabtree & Co., Great Yarmouth.

* 7 Drifters, Steel	Crabtree & Co., Ltd.	1,260	140
† 3 ,, ,,	Cochrane & Sons	680	180
* 1 ,, ,,	,, ,,	180	140
† 1 ,, ,,	Caledon Ship and Eng. Co.	[illegible]	180
† 1 ,, Wood	Fellows & Co., Ltd.	200	180
* 1 ,,	,, ,,	[illegible]	140
* 1 ,,	Beeching Bros., Ltd.	[illegible]	140
* 2 ,,	John Chambers	360	140
* 1 ,,	Richards & Co., Ltd.	[illegible]	140
* 2 Tugs, Steel	G. Rennie & Co.	[illegible]	[illegible]
* 1 ,,	H. & C. Grayson, Ltd.	[illegible]	[illegible]
2 Engines exported		[illegible]	
	Total	[illegible]	

John Dickinson & Sons, Ltd., Sunderland.

S.S.'s Lexie, Etolia, Holly Branch, Braskar, Birchfield, Vendee, Vosges, Grangemoor, Cento, Paignton, Cherbury, Northern, Abbas, Meroe, Mexicano, Erlesburgh, Maisie, Cheltonion, Marietta N.

The total Lloyd's N.H.P. is 6,460, and the estimated I.H.P. [illegible]

R. & W. Hawthorn, Leslie & Co., Ltd., Newcastle-on-Tyne.

‡ 2 Battleships, 2 Cruisers, 3 Destroyers	12,200 S.H.P.
‡ 1 Cruiser (Boilers only)	[illegible]
	Total [illegible]

All the above are for British and Foreign Navies.

Charles D. Holmes & Co., Ltd., Hull.

Escalloma, Jacamar, Herbert & Florence	Cook, Welton & Gemmell, Ltd.	[illegible]	
† Croxby, Garu and Ralco	,, ,, ,,	[illegible]	
* Nigathawk		600	
† Parthian & Athelstan		[illegible]	
* Mackenzie, Mina and St. Malo		[illegible]	
* Wallington	Cochrane & Sons	[illegible]	
* Bern, Neil Crow and Peronia		[illegible]	—
† Weigelia and Xylopia	,, ,,	[illegible]	—
* Vandal, Lord Salisbury, Michael Angelo, Principe & Lord Knollys		[illegible]	
† Sutton		[illegible]	
* Lord Halifax and Lord Wenlock	,, ,,	[illegible]	—
	Total	[illegible]	

Geo. T. Grey, South Shields.

* Mary Hardcastle, Cargo Steamer	R. Thompson & Sons, Ltd.	[illegible]	—
* Sutton Dredger	Meyer's Shipbuilding Co.	[illegible]	—
* Fairlawn, Steel Tug	Eltringham & Co.	[illegible]	
* Zeta, Cargo Steamer	Vickers & Sons	[illegible]	—
* Wheeler	Newbigin	[illegible]	—
	Total	[illegible]	

* Compound. † Triple. ‡ Turbine.

L. & J. Hosking, Ltd., London.

2 Yachts' Launches, British and Foreign		Total 2,545	

MacColl & Pollock, Ltd., Sunderland.

Name of Vessel	Builders.	I.H.P.	Press lbs.
Eldenor		780	180
Mile End		980	180
Mary Beard		1,180	180
Alvarine		330	180
S.S. No. 294		480	180
Basurto		420	180
Leon y Castillo		850	180
		5,250	
In addition, 13 Boilers		3,774	
	Total	9,004	

Mersey Engineering Works Co., Ltd., Liverpool.

Nos. 47, 48, 49 and 50, Steel Launches, Elder, Dempster & Co.	Pimblott & Sons, Northwich	2060	1200a
Steel Tug Help, for West African Lighterage & Transport Co.		35	120
Steel Launch for Sierra Leone Coasting Co.		20	120
Inhambane, Steel Tug		70	120
Auxiliar, Steel Tug		70	120
2 Steel Launches		20	120
3 Steel Launches	Roberts & Son, Chester	20	120

North-Eastern Marine Engineering Co., Ltd., Wallsend and Sunderland.

Augustza Fohorezegno	Fiume	2,050	—
Annan Maru	Osaka	1,700	—
Almouth	Newcastle	1,800	—
Amicus	Cardiff	2,040	—
Armora	Manchester	1,260	—
Bangor	Christiania	3,060	—
Ben Lomond	Leith	2,610	—
Bretwalda	Newcastle	2,040	—
Cliftonian	Cardiff	2,200	—
Ceylon	Gothenburg	3,500	—
Cayo Romano	London	2,200	—
Cho-Sen Maru	Osaka	1,700	—
Cornwood	London	1,475	—
Chinese Prince	Newcastle	3,075	—
Denis	Liverpool	2,650	—
Daphne	Caen	1,175	—
Darnholme	Whitby	2,040	—
Dalewood	London	1,645	—
Extord	Cardiff	2,245	—
Ford Castle	Sunderland	1,195	—
Fluent	Sunderland	1,950	—
Gabrielle	Caen	1,055	—
Halvdan	Drammen	2,220	—
Henrik		2,220	—
Hockwold	London	1,020	—
Hyltonia	Newcastle	1,180	—
Ihumata	New Zealand	850	—
Japan	Gothenburg	3,500	—
Kinross	Newcastle	1,950	—
Kronstad	Sandefjord	1,600	—
Linaria	North Shields	1,650	—
Modiva	Haugesund	850	—
Minster	London	1,945	—
Mavisbrook	Glasgow	1,700	—
Marguerite	Caen	1,140	—
Nestorian (Quadruple)	Liverpool	3,060	—
Olga	Esbjerg	485	—
Pancras	Liverpool	2,650	—
Polly	Esbjerg	485	—
Rothley	Newcastle	2,150	—
Roi Albert	Antwerp	1,900	—
Roddam	Newcastle	1,800	—
Rignor	Esbjerg	485	—
Redesmere	Manchester	1,355	—
Sandefjord	Sandefjord	3,500	—
San Andres	Christiania	1,825	—
Seaford	London	670	—
San Mateo	Christiania	1,825	—
Siamese Prince	Newcastle	3,075	—
Sangstad	Christiania	1,375	—
Transporter	Newcastle	1,345	—
Vard	Christiania	1,915	—
Walter Demmayer	King's Lynn	870	—
Yorkton	Sunderland	935	—
		98,105	
Vessels fitted with new boilers :—			
Borjom		915	—
General Havelock		560	—
Uriel		225	—
Vampire		225	—
	Total	100,050	

Of the above total 55,080 I.H.P. were constructed at the Wallsend Works and 44,950 I.H.P. at the Sunderland Works.

The Parsons Marine Steam Turbine Co., Ltd., Wallsend.

ℓ H.M.S. King George V.	H. M. Dockyard, Portsmouth	—	—
ℓ H.M.S. Edgar	Wm. Denny & Bros.	—	—
ℓ H.M.S. Beaver	Wm. Denny & Bros.	—	—
∥ S.S. Normannia	The Fairfield Shipbuilding and Engineering Co., Ltd.	—	—
	Total	68,500	

ℓ Turbine. ∥ Compound Diagonal Turbine.

Plenty & Sons, Ltd., Newbury.

Name of Vessel.	Builders.	I.H.P.	Press lbs.
*†	British	3,950	
*†	Colonies	620	
*†	Foreign	1,670	
	Total	6,240	

"Kromhout" Marine Oil Engines ranging from 28 to 90 B.H.P., for vessels built in Great Britain and the Colonies. 824 B.H.P. Total.

J. P. Rennoldson & Sons, South Shields.

* Merman, Screw Tug	J. P. Rennoldson & Sons	370	130
* Linesman, Screw Tug	,,	370	130
* Tynesider, Screw Steamer	,,	225	130
†† William Gray, Screw Tug	,,	910	140
* Careena, Screw Steamer	,,	425	130
	Total	2,300	

Richardsons, Westgarth & Co., Ltd., Hartlepool.

S.S. El Paraguayo (Twin Screw)	6,000	—
S.S. Clan Macphee	4,000	—
S.S. Nigaristan	3,830	—
S.S. Rawson	2,700	—
S.S. Lingan	2,500	—
S.S. South Point	2,300	—
S.S.'s American Transport, Australian Transport, Chiltern Range, Cotovia, Dale Bank, Gifford, Manningtry, Messina, Oreland, Oristano and Peebles	2,000ea	—
S.S. Brierton	1,850	—
S.S.'s Glenbridge and Glendene	1,800ea	
S.S. Zevenbergen	1,600	—
S.S.'s Andalusian and Yi Loong	1,500ea	—
S.S. Campeiro	1,400	—
S.S. New Abbottshall	1,350	—
S.S. Graceful	1,100	—
S.S.'s Cadmus, Saltburn, Ubbergen and Vryhandel	1,000ea	—
S.S. Hampshire Coast	900	—
S.S. Oran	600	—
S.S. Tees	500	—
S.S. Petrel	400	—
	63,630	
Steam Turbines	13,300	—
Land Steam Engines	8,900	—
Marine and Water-tube Boilers	13,150	
Total	98,980	

In addition to the above, a considerable amount of miscellaneous work has been completed, including "Contraflo" condensing plants, regenerative accumulators, steel furnaces and other iron and steel works plant.

The Shields Engineering and Dry Dock Co., Ltd., North Shields.

† 17 Trawlers	Smith's Dock Co.	8,475	—
† 1 Whaler	,,	365	—
m 2 Whalers	,,	480	—
* 1 Launch	,,	170	—
† Island Prince, Trawler	J. T. Eltringham & Co.	460	—
Olympia, Screw Tug	,,	610	
* Cecilia, Screw Tug	,,	610	
† Huskisson, Screw Tug	,,	860	—
* Roburn, Drifter	Sanders & Co.	195	—
m Sound of Jura, Sailing Ship		310	
	Total	12,535	

Sisson & Co., Ltd., Gloucester.

ƒ Grenfell, Stern Wheel	50	175
‡‡ Unknown, Tug Launch	160	130
‡‡ Connaught, Single Screw Passenger Launch	135	165
† Pleasure Launch for Windermere	30	200
ƒ Side Paddle Wheel	80	165
Pleasure Launch for Windermere	—	150
Passenger Launch for Severn and Avon	—	160

During the last year about 2,100 brake H.P. "Sisson" enclosed self-lubricating engines have been completed, in addition to three sets of steam machinery for main line railway motor coaches.

Thames Ironworks Shipbuilding and Engineering Co., Ltd., Canning Town.

Total 52,000 S.H.P.

Vauxhall and West Hydraulic Engineering Co., Ltd., Luton, Beds.

* 5 Sternwheelers	British	1,275	
† Passenger Steamer		550	160
* Tug		90	130
* Side Paddle Steamer		220	150
ƒ† Fire Float		120	150
* Coal Lighter		80	130
† Tug		600	190
	Total	2,935	

The Wallsend Slipway and Engineering Co., Ltd., Wallsend-on-Tyne.

S.S. Benguela, Single Screw	Swan, Hunter & Wigham Richardson, Ltd.	3,600	—
S.S. Koursk, Single Screw	,,	3,300	—
S.S. City of Lahore, Single Screw	,,	4,300	—
S.S. Laconia, Twin Screw		14,500	—
ℓ H.M.T.B.D. Sandfly		13,500	—
S.S. Saldanha, S. Screw		2,800	—
S.S. Princess Alice, Single Screw		4,500	—

* Compound. † Triple. †† Twin Compound. ‡‡ Compound Surface Condensing. *† Compound Triple. m Motor. ℓ Turbine. ƒ Compound Non-Condensing Triple.

The Wallsend Slipway and Engineering Co., Ltd., Wallsend-on-Tyne.

Continued

Name of Vessel	Builders	I.H.P.	Press. lbs.
S.S. Indrapore, T. Screw	Swan Hunter & Wigham Richardson, Ltd.	6,200	
S.S. City of Poona, Twin Screw		1,600	
S.S. Clan Macgillivray, Single Screw	Sir W. G. Armstrong, Whitworth & Co., Ltd.	1,000	
S.S. Magdeburg, Single Screw		[illegible]	
S.S. Aegean, Single Screw	Tyne Iron Shipbuilding Co.	2,000	
S.S. Bosphorus, Nos. 67 and 68	R. & W. Hawthorn, Leslie & Co., Ltd.	6,000	
S.S. Outward Alt, Single Screw	Messrs. W. Dobson & Co.	2,000	
	Total	72,500	

In addition to the above, new boilers were supplied to vessels representing a total horse power of 27,500.

SCOTCH.

THE CLYDE, Etc.

Ailsa Shipbuilding Co., Ltd., Ayrshire.

Name of Vessel	Built or	Owners	G.T. Regis.	G.T. indicated	I.H.P.
Landing Stage	—		44		
No. 1 Crane	—		[illegible]		
8 Barges	—		576		
Missouri, Single Screw	—	British	80		100
Waterwitch, Schooner Racing Yacht	—	,,	176		
Barman, Twin Screw	—	Colonial	275		1,000
Amoretta, Single Screw	—	British	141		400
Lady Ismay, Paddle Steamer	—	,,	151	—	1,000
Coramba, Twin Screw	—	Colonial	1[illegible]	—	720
Maxis, Single Screw	—	British	1,200	—	2,000
Wollongbar, Twin Screw	—	Colonial	2,000	—	1,000

Engines up to 1,000 I.H.P., by the same Company as listed.

Alley & MacLellan, Ltd., Polmadie.

14 Barges	—	—	Foreign	2,070	—
4 Sternwheel Steamers	—	—	,,	[illegible]	—
2 Paddle Boats	—	—	,,	103	—
2 Motor Boats	—	—	—	[illegible]	
2 Single Screw Boats	—	—	,,	95	—

1 Sternwheel Steamer engined by the Company.

Ardrossan Dry Dock and Shipbuilding Co., Ltd., Ardrossan.

Hopple, Single Screw	—	—	Maryborough	267	—
Skarv and Tarv, do.	—	—	Glasgow	1,400	—
Coolebar and Gunbar, Twin Screw	—	—	Sydney	17,000	—

Barclay, Curle & Co., Ltd., Whiteinch.

City of Baroda, Single Screw	—	—	British	5,200	
Edavana, Twin Screw	—	—	,,	4,[illegible]	
Elephanta, Twin Screw	—	—	,,	4,[illegible]	
Guildford Castle, Twin Screw	—	—	,,	8,056	—
Poland, Single Screw	—	—	,,	1,[illegible]	
Jutlandia, Twin-Screw Motor Vessel	—	—	Foreign	[illegible]	
Baroda, Single Screw	—	—	British	[illegible]	
Melford Hall, Single Screw	—	—	,,	[illegible]	

All engined by same Company.

William Beardmore & Co., Ltd., Dalmuir.

H.M.S. Conqueror	—	—	British	22,[illegible]	
H.M.S. Colossus	—	—	,,	[illegible]	
T.S.S. Waitala	—	—	Colonial	[illegible]	

Engines by same Company.

Geo. Brown & Co., Greenock.

T.S.S. Geo. Watt	—	—	British	[illegible]	
S.S. name not known	—	—	Foreign	[illegible]	
S.S. Dorat	—	—	,,	[illegible]	
S.S. Lampo	—	—	,,	[illegible]	
S.S. Lady Brown	—	—	British	[illegible]	
S.S. Lord Brown	—	—	,,	[illegible]	
T.S.S. Artiga	—	—	Foreign	[illegible]	

John Brown & Co., Ltd., Clydebank

Argyllshire, T.S. Pass. and Cargo Steamer	—	—	British	[illegible]	
Shropshire, do.	—	—	,,	[illegible]	
Wiltshire, do.	—	—	,,	[illegible]	
* Australia, Battle Cruiser	—	—	,,	[illegible]	
Dromore, Triple-screw Pass. and Mail Steamer	—	—	,,	[illegible]	
† Hunt, Torpedo Boat Destroyer	—	—	,,	[illegible]	
* Hunt, do.	—	—	,,	[illegible]	
* Bonnette, Steam Yacht	—	—	,,	[illegible]	

Engines by the same Company.

In addition to the above, turbines of [illegible] hp were supplied to H.M.S. Yarmouth.

Caird & Co., Ltd., Greenock.

‡ Mobira	—	Steel	British	[illegible]	—
‡ Ballarat	—	—	,,	[illegible]	—

‡ Turbine. †† Turbine Triple. † Triple. * Quadruple.

The Campbeltown Shipbuilding Co., Campbeltown.

Name of Vessel	Built or	Owners	G.T. Regis.	G.T. indicated	I.H.P.
Leuchtfeld	—	Steel	Colonial	[illegible]	
Andorra	—	—	British	[illegible]	
Dunstaffnage	—	—	[illegible]	[illegible]	
Margaret	—	—	—	[illegible]	

Wm. Chalmers & Co., Ltd., Rutherglen.

Barge, No. 1	—	Passenger	Steel	British	[illegible]
Various Vessels	—	—	—	—	[illegible]

Clyde Shipbuilding & Engineering Co., Ltd., Port Glasgow.

Essex, S.S.	—	—	British	1,372	
Lady Gwendolen, S.S.	—	—	,,	[illegible]	
Etrate, S.S.	—	—	,,	[illegible]	
Mentelo, S.S.	—	—	Colonial	[illegible]	
Sula, S.S.	—	—	British	[illegible]	
Emerald Wings, Machinery	—	—	,,	—	—

Engines by the same Company.

Charles Connell & Co., Ltd., Scotstoun.

Berwick Law	—	—	British	[illegible]	
Haviddar	—	—	,,	[illegible]	
Frankmere	—	—	,,	[illegible]	
Glenctive	—	—	,,	[illegible]	
Glenartney	—	—	,,	[illegible]	
Stephino	—	—	,,	[illegible]	
Glenspean	—	—	,,	[illegible]	
Sculptor	—	—	,,	[illegible]	

Denny & Brothers, Dumbarton.

Sheldrake, T.B.D.	—	—	British	[illegible]	
Badger, T.B.D.	—	—	,,	[illegible]	
Beaver, T.B.D.	—	—	,,	900	
Defender, T.B.D.	—	—	,,	[illegible]	
Druid, T.B.D.	—	—	,,	[illegible]	
Remuera, T.S.S.	—	—	Colonial	11,279	
Riviera, Turbine	—	—	British	1,07[illegible]	
Engadine, Turbine	—	—	,,	1,079	
Empura, T.S.S.	—	—	,,	[illegible]	—
Mandalay, S.S.	—	—	,,	[illegible]	
Arracan, S.S.	—	—	,,	[illegible]	
Lady Inchcape, Tug	—	—	Colonial	[illegible]	
Light draught craft shipped abroad in pieces	—	—	—	[illegible]	—

Robt. Duncan & Co., Ltd., Port Glasgow.

Queen Adelaide, Screw Stmr.	—	Steel	British	[illegible]	

David J. Dunlop & Co., now Dunlop, Bremner & Co., Ltd., Port Glasgow.

Afton, Passenger and Cargo Steamer, Channel	—	—	British	[illegible]	—

Engines by same Firm.

The Fairfield Shipbuilding and Engineering Co., Ltd., Govan.

‡ New Zealand, Battleship Cruiser	—	—	Colonial	—	—
Gloucester Castle, Cape Service, Twin Screw	—	—	British	—	—
Maunganui, New Zealand-Australia, Twin Screw	—	—	,,	[illegible]	[illegible]
Saguenay, Canada Lake, Twin Screw	—	—	Colonial	—	—
‡† Normannia, English Channel Service	—	—	British	—	—
‡ No. 482 not yet named	—	—	—	—	—

Also repairs to H.M.T.B.D. Arab and [illegible], new boiler, etc. to auxiliary s.s. Lady Tertrida.

Ferguson Brothers, Port Glasgow.

Dredger	—	—	British	[illegible]	
Tug	—	—	,,	[illegible]	—
7 Hoppers	—	—	,,	[illegible]	

Fleming & Ferguson, Ltd., Paisley.

* No. [illegible], Dredger	—	—	Steel	Colonial	[illegible]
* Cleveland Bay, Dredger	—	—	—	—	[illegible]
* India, Dredger	—	—	—	British	[illegible]
* No. [illegible], Dredger	—	—	—	Colonial	[illegible]
* No. [illegible] & [illegible], Dredger	—	—	—	British	[illegible]
* Stark, Dredger	—	—	—	Colonial	[illegible]
* T.I.C. No. [illegible], Dredger	—	—	—	British	[illegible]
* Irvine, Dredger	—	—	—	,,	[illegible]
* No. [illegible], Dredger	—	—	—	Colonial	[illegible]
* Two sets of Triple-Screw Engines shipped to Canada	—	—	—	—	[illegible]
† Three sets of Marine Type Sewage Pumping Engines shipped abroad	—	—	—	—	[illegible]

Engines by same Company.

Wm. Fife & Sons, Fairlie.

Lorna, Cutter	—	—	Wood	British	[illegible]
Cutter & Marty, do. Cutter Composite	—	—	—	—	—
Lindisfarne, Cutter	—	—	Wood	,,	[illegible]
Nerissa, Cutter	—	—	—	,,	[illegible]
Fast Steder II., C.B. Engine	—	—	—	,,	[illegible]
Nerissa, C.B. Cutter	—	—	—	,,	[illegible]
Mavis, Cutter	—	—	—	,,	[illegible]
Mavis, do. Cutter	—	—	—	,,	[illegible]

John Fullerton & Co., Paisley.

Wood, Screw	—	—	Steel	British	[illegible]
* [illegible], Screw	—	—	—	—	[illegible]
† [illegible], Screw	—	—	—	British	[illegible]
[illegible], Screw	—	—	—	Colonial	[illegible]

† Triple. * Quadruple. ‡ Turbine. ‡† Composite Engines.

The Greenock & Grangemouth Dockyard Co., Ltd., Greenock and Grangemouth.

Grangemouth Yard.

Name of Vessel	Built of	Owners	G.T. Regis.	G.T. inclu. erect.	I.H.P.
Satyavati and Lilavati, two Screw Cargo and Pass. Steamers	Steel	Indian	205ea	-	850ea
Dorothy Hough, Screw Cargo & Pass. Steamer	,,	British	1,873		1,200
Cottrell, Screw Collier		Colonial	1,141		1,000
Trogu, Steel Single Screw, for Steamer for carrying oil in bulk	,,	British	709	—	600

Greenock Yard.

Name of Vessel	Built of	Owners	G.T. Regis.	G.T. inclu. erect.	I.H.P.
Burma, R.F.A., for carrying oil in bulk, Single Screw	Steel	British	1,832	—	1,270
Balvenie and Garganey, 2 Screw Cargo Steamers	,,	,,	872ea	—	850ea
Essex Abbey, Screw Cargo Steamer	,,	,,	5,304	—	1,838

Wm. Hamilton & Co., Ltd., Port Glasgow.

Saint Stephen	—	British	4,398	—	1,800
Lord Lonsdale	-	,,	4,566	—	2,200
Santa Rosalia	-	,,	5,409	-	2,700
Karmoen	—	Foreign	5,464	—	4,500
Karmata	—	,,	5,462	—	4,500
Pontoons etc.	—	British	800	- -	—

David & William Henderson & Co., Ltd., Partick.

Cameronia, Twin-screw	Steel	British	10,963	—	15,600
San Guglielmo	,,	Foreign	8,146	-	6,650
Moralta, Twin-screw	,,	Colonial	1,947		2,225
Duchess of Norfolk, Paddle	,,	British	381	—	1,075
Botanist, Screw	,,	,,	7,680	—	4,250
Motor Water Barge, Screw	,,	,,	130	-	35

Lobnitz & Co., Ltd., Renfrew.

* Marechal Hermes, Rockcutter	—	Foreign	318	—	400
† King George, Hopper Dredger	—	Colonial	634	—	1,200
* Dehmi, Sternwheel Steamer	—	Foreign	199	—	250
† Dredgers Nos. 6 and 7, Bucket Dredgers	- -	British	780ea	—	1,200ea
* Bate, Twin-screw Steamer	- -	,,	503	—	450
‡ Marruma and Dombe, Sternwheel Steamers	-	Foreign	60ea	-	150ea
* Talcahuano, Rockcutter	-	,,	318	-	400
† Hoppers Nos. 4 and 5, Steam Hopper Barges	—	British	842ea	—	1,250ea
Victor Largeau, Sternwheel Steamer	—	Foreign	150		300
Pacifico, Screw Tug	-	,,	149	—	500
* Lucy Bell, Suction Dredger	—	,,	90	—	150
8 Lighters	—	,,	540	-	—
4 Rockcutters	—	,,	300	—	600

London and Glasgow Engineering and Shipbuilding Co., Ltd., Govan.

t H.M.S. Yarmouth, Cruiser	- -	British Gvt.	5,200dis.	—	22,000S.H.P.
† Indraghiri, Screw Steamer	Steel	British	5,600	—	4,000

R. McAllister & Sons, Dumbarton.

Octavia, Composite Cutter Yacht	—	British	99		-
Speedwell, Cutter Yacht	Wood	,,	8	-	—
Peter Pan, Motor Yacht	Composite	Foreign	69	—	—

Peter McGregor & Sons, Kirkintilloch.

‡‡No. 50, T.S.S.	Steel	Colonial	85	-	350
‡ No. 51, Launch	Mahogany	Foreign	5	—	50
m‡No. 52, Despatch Launch	Steel	Colonial	30	-	180
Shipment	,,	British	40	—	—
,,	,,	,,	10	-	—
d‡Toiras, No. 55, S.S.	,,	Foreign	70	—	220
Shipment	,,	British	10	—	—

Mackie & Thompson, Ltd., Govan.

† Koning Albert, Trawler		Foreign	216	96	420
† Ustica, S.S.	—	,,	400	194	600
† Pantelleria, S.S.	—	,,	406	196	600
† Lampedusa, S.S.	—	,,	404	195	600
† 5 Drifters	—	British	99ea	38ea	280ea
† King Coal, Sailing Vessel	—	,,	554	495	—
† Lapwing, S.S.	—	,,	1,192	495	2,000
* Merlin, S.S.	—	,,	145	57	250
16 Barges	—	Foreign	1,440	1,440	—

Archd. McMillan & Son, Ltd., Dumbarton.

Coila	Steam Steel	British	4,135	—	—
Saint Leonards	,, ,,	,,	4,574	—	—
Baron Erskine	,, ,,	,,	5,585	—	—
Calcutta	,, ,,	Foreign	5,607	—	—

R. Munro, Ardrishaig.

Clan Gordon	Wood	British	14	—	15
Co-Na-Mara	,,	,,	8	—	9
———	,,	—	2	—	4½
——— Sail		—	4	—	—
———	,,	—	2	—	—

Murdoch & Murray, Port Glasgow.

Moacyr, T.S.S.	Steel	Foreign	578	—	700
Sobralense, S.S.	,,	,,	320	—	450
2 Barges, Sailing	,,	,,	100	—	—

* Compound. † Triple. ‡ High Pressure. *t* Turbine.
‡‡ Compound Surface Condensing.
m‡ Motor High Pressure. *d*‡ Tandem Diagonal, High Pressure.

Messrs. Napier & Miller, Ltd., Old Kilpatrick.

Name of Vessel	Built of	Owners	G.T. Regis	G.T. inclu erect.	I.H.P.
† S.S. Baron Polwarth	—	British	4,912	—	2,900
* S.S. Sao Pedro	—	Foreign	227	—	500
† S.S. Seal	—	Colonial	610	—	900
* S.S. Curama	—	Foreign	200	—	300
† S.S. Sheng Ta	—	,,	1,625	—	1,400
† S.S. Mont Cenis	—	,,	3,800	—	1,500
* S.S. Halifax	—	Colonial	600	—	600
† S.S. Bruce	—	,,	1,700	—	2,800
† T.S.S. Ramos	—	Foreign	270		270

Ritchie, Graham & Milne, Whiteinch.

Colony	Steam Steel	Foreign	150	—	190
Rita	,, ,,	,,	20	—	30
Jackal	,, ,,	,,	15	—	25
Providencia	,, ,,	,,	30	—	90
Mairi	Motor ,,	British	65	—	130
Barge	Sail ,,	,,	250	—	-
Brazil	Steam ,,	Foreign	120		120
Barges	Sail ,,	Colonial	240		-
Floating Dock	,, ,,	Egypt	450		—

A. Robertson & Co., Sandbank, Argyllshire.

10 Steam Pinnaces and Launches	Wood	British	114	—	—

A. Rodger & Co., Port Glasgow.

Robert Dollar, Two-deck Steamer	—	British	5,356	-	2,750
Baron Sempill, Shelter-deck Steamer	- -	,,	1,606	—	1,100
Glensloy, Single-deck Steamer	—	,,	3,673	—	1,800
Baron Jedburgh, Shelter-deck Steamer	—	,,	4,430	—	3,100

Russell & Co., Port Glasgow.

Hurunui, Twin-screw Cargo Steamer (insulated)	-	British	8,920	-	—
Highland Warrior, Shelter-deck Pass. and Cargo Steamer (insulated)	—	,,	7,485	-	—
Crown of Toledo, Shelter-deck Passenger and Cargo Steamer	- -	,,	6,070	- -	-
Veturia, Cargo Steamer	-	,,	5,610	—	—
Volumnia, Cargo Steamer	—	,,	5,607	—	—
Den of Airlie, Shelter-deck Cargo Steamer	-	,,	5,363	- -	—
Lovat, Shelter-deck Cargo Steamer	—	,,	5,329	- -	- -
Cape Ortegal, Cargo Steamer	—	,,	4,895		-
Saint Bede, Cargo Steamer	—	,,	4,895	-	- -
Kirkfield, Cargo Steamer	—	,,	4,753	-	- -
Trafalgar, Cargo Steamer		,,	4,571	-	—
Wirral, Cargo Steamer	—	,,	4,206	-	—
Emerald Wings, Cargo Steamer	—	,,	3,138	-	—
Chinde, Twin-screw Pass. and Cargo Steamer	-	Foreign	1,381	-	—

Scott & Sons, Bowling, nr. Glasgow.

† Semender, Screw Tug	Steel	British	105	—	400
* Atlantico, ,,	,,	Foreign	146	—	525
†Curupayty, Screw Steamer	,,	,,	489	—	675
† Pelorus, ,, Tug	,,	,,	128	—	450
* Saint Oran, ,, Steamer	,,	British	237	—	260
* No. 232, ,, Tug	,,	,,	70	-	230
No. 236 ,, ,,	,,	,,	105	—	400

Scotts' Shipbuilding and Engineering Co., Ltd., Greenock.

S.S. Atreus	—	—	6,698	—	4,600
S.S. Rhesus	—	-	6,704	—	4,600
T.S.S. Hildebrand	- -	-	6,991	—	6,200
S.S. Krian	—		845	—	1,200
T.S.S. Talthybius	—	—	10,239	—	5,500

Engines by same Company.

Wm. Simons & Co., Ltd., Renfrew.

Dredger	—	Colonial	2,097	—	3,850
3 Barges	—	,,	200ea	—	—
Pumping Machinery	—	,,	-	—	860
Dredger	—	Foreign	1,683	—	2,340
Dredger	—	,,	308	—	525
Dredger	—	Colonial	1,112	—	1,600
Pumping Machinery		,,	—	—	1,920
Barge	—	,,	300	—	—

Besides the above a large quantity of dredging machinery, boilers and sand pump plant has been delivered to foreign and home ports during the past year.

Alex. Stephen & Son, Ltd., Govan.

† Ellenga, Twin S.S.	Steel	British	—	4,999	—
† Mauzaures, S.S.	,,	,,	—	1,093	—
† Ellora, Twin S.S.	,,	,,	—	5,201	-
* Campaigner, Tug	,,	,,	—	162	—
† Clan Macnaughton, S.S.	,,	,,	-	4,984	
† Anchoria, S.S.	,,	,,	-	5,429	
† Media, S.S.	,,	,,	-	5,437	-
† El Uruguayo, Twin S.S.	,,	,,	—	7,850	-

Engines by the same Company.

* Compound. † Triple

Yarrow & Co., Ltd., Glasgow.

Name of Vessel.	Built of	Owners.	G.T.	G.T. incl. erect.	I.H.P.
[illegible] torpedo boat		[illegible]	[illegible]		[illegible]
[illegible] Screw Motor Boat		Foreign	[illegible]		300
H.M.S. [illegible] T.B.D.		British Admiralty			[illegible]
H.M.S. [illegible] T.B.D.		,,			[illegible]
[illegible] Steamer		Foreign	[illegible]		[illegible]
Shallow Draught [illegible]		,,	[illegible]		[illegible]
Shallow Draught Launch Hull		N. Zealand	[illegible]		
Isabel, Shallow Draught Launch		Foreign	[illegible]		
Shallow Draught Barge			[illegible]		
			[illegible]		
			110		
			[illegible]		
1 Yarrow Water-tube Boiler					110
Engines & Boiler for Launch					[illegible]
Engines and Boiler for Stern-wheeler					60
Shallow Draught Steamer			125		[illegible]

THE FORTH Etc.

John Cran & Co., Leith.

Name of Vessel.	Built of	Owner.	G.T. Regis.	G.T. incl. erect.	I.H.P.
[illegible]	Steel	British	[illegible]		[illegible]
[illegible] the Martyr			[illegible]		
[illegible]	W[illegible]		[illegible]		[illegible]
[illegible]	Steel	Foreign	[illegible]		[illegible]
[illegible]	,,	British	[illegible]		[illegible]
[illegible]	,,	[illegible]	[illegible]		
[illegible]	,,	Foreign	[illegible]		
	Wood	British			
,, ,,	Steel	Colonial	10		

Hawthorns & Co., Ltd. Leith.

[illegible] Tug		Foreign		
Hopper Barge		British		

Mackay Bros., Alloa.

[illegible] 2 Drifters		British	[illegible]	[illegible] ea
[illegible] S.S.		Foreign	[illegible]	[illegible]

† Triple.

Ramage & Ferguson, Leith.

[illegible] yacht	Steel	Foreign	[illegible]	[illegible]
Kann[illegible] screw steamer		Colonial	[illegible]	[illegible]
[illegible] screw steamer		[illegible]	[illegible]	[illegible]
[illegible] twin-screw steamer		Colonial	[illegible]	[illegible]
Albert twin-screw steamer		British	[illegible]	[illegible]

Engines by same Company.

J. Weatherhead, Eyemouth.

[illegible] Bohn[illegible], herring drifter	Wood	British	62·7[illegible]	120 B.H.P.

THE TAY.

The Caledon Shipbuilding and Engineering Co., Ltd., Dundee.

Name of Vessel.	Built of	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
[illegible]	Steam	Steel	British	2,548	[illegible]
[illegible] Warrior			[illegible] ea	1,578ea	[illegible]
[illegible]		[illegible]	[illegible]	[illegible]	2,420
[illegible]		British	2,187	[illegible]	[illegible]
[illegible]			[illegible]	[illegible]	[illegible]
[illegible]		[illegible]	[illegible]	[illegible]	[illegible]
Viera y Clavijo ..		[illegible]	[illegible]	[illegible]	850
Cyclamen		British	[illegible]	[illegible]	230

Engines by the same Company.

THE DEE.

The John Duthie Torry Shipbuilding Co., Torry.

Name of Vessel.	Built of	Owner.	G.T. Regis.	G.T. incl. erect.	I.H.P.
Crathie and Allan Ramsay, steam trawlers	—	British	[illegible]		100ea
[illegible] steam trawler		Foreign	[illegible]		820
T[illegible], steam trawler		,,	[illegible]		[illegible]
[illegible], steam trawler		,,	[illegible]		[illegible]
Impregnable, steam drifter	—	British	[illegible]		250
[illegible] steam drifter			92		[illegible]
Marie, steam drifter	—	,,	[illegible]		
M[illegible] of Moray, steam drifter	—		[illegible]		200
[illegible] steam drifter			[illegible]		200ea
Andrina, steam drifter ..	—		[illegible]		250
[illegible] steam drifter		,,	90	—	[illegible]
Belle o' Moray, steam drifter	—	,,	84	—	[illegible]
[illegible] trawler		,,	[illegible]		[illegible]
Daisy and Esther, Admiralty [illegible]	—	,,	220ea		[illegible]
[illegible] steam trawler		Foreign	220		[illegible]

[illegible]

Alexander Hall & Co., Ltd., Aberdeen.

Name of Vessel.	Built of	Owners.	G.T.	G.T. [illegible]	I.H.P.
M[illegible] steam trawler		[illegible]	[illegible]		400
[illegible]			[illegible]		400
[illegible] M[illegible], trawler			[illegible]		400
[illegible]			[illegible]	—	[illegible]
James S. Melville, trawler ..	—	,,	211	—	400
V[illegible] Moray, drifter ..	—	,,	87		250
N[illegible], trawler			[illegible]		400
[illegible] steamer			[illegible]		400
Stewart [illegible], trawler			[illegible]		400

Engines by the same Company.

Hall, Russell & Co., Ltd., Aberdeen.

Name of Vessel.	Built of	Owners.	G.T.	G.T.	I.H.P.
J[illegible], steam trawler		British	[illegible]		[illegible]
A[illegible], steam trawler		,,	[illegible]		[illegible]
Str[illegible], steam trawler		,,	[illegible]		[illegible]
St[illegible], steam trawlers		Foreign	[illegible]		[illegible]
W[illegible]ful, coastguard cruiser	—	British	378	—	850
H[illegible] steam trawler			[illegible]		[illegible]
K[illegible], steam trawler			[illegible]		[illegible]
George D[illegible], steam trawler			[illegible]	—	475
[illegible] steam trawler			[illegible]		[illegible]
Strath[illegible], steam trawlers	—	,,	193ea		[illegible] ea
Strath[illegible], steam trawlers			[illegible]		[illegible] ea
Earl M[illegible], steam trawler			[illegible]		[illegible]
Northman, steam trawler			[illegible]		[illegible]
Aber[illegible]			[illegible]	—	950
[illegible] W[illegible], steam trawlers			[illegible] ea		475ea
James [illegible], steam trawler			[illegible]	—	475

LIST OF VESSELS ENGINED IN 1911.

J. Abernethy & Co., Aberdeen.

Name of Vessel.	Builders.	I.H.P.	Press. lbs.
† Crathie and Allan Ramsay, Trawlers	John Duthie Torry S.G. Co. ..	[illegible]	[illegible] ea
† R[illegible], Trawler	,,	850	180
† Thais, Trawler	,,	575	180
† V[illegible], Trawler		300	[illegible]
* *Maid of Moray, [illegible] S[illegible], Drifters	,, ,,	[illegible] ea	[illegible] ea
† Marie, Drifter	,,	[illegible]	[illegible]
* Flower o' M[illegible], Drifter	W. & G. Gardner	[illegible]	[illegible]
† Northern [illegible] Drifter	John Duthie Torry Co.	260	180
* Belle o' Moray, Drifter	,,	220	[illegible]
† Daisy and Esther, Admiralty Special [illegible]	,,	[illegible] ea	[illegible] ea
Total		[illegible]	

Aitchison, Blair & Co., Clyde Bank.

Name of Vessel.	Builders.	I.H.P.	Press.
‡ Single Screw ..	Foreign	550	[illegible]
[illegible] Screw	Napier & Miller, Ltd.	900	[illegible]
‡ Single Screw	Foreign	650	[illegible]
[illegible]		[illegible]	[illegible]
‡ 2 Twin Screw [illegible]		[illegible] ea	[illegible] ea
‡ Single Screw		[illegible]	[illegible]
‡ Twin Screw		[illegible]	[illegible]
‡ Single Screw		190	[illegible]
‡ ,,		190	150
‡ Halifax, [illegible] Screw [illegible]	Napier & Miller, Ltd.	500	[illegible]
* Twin Screw	[illegible]	[illegible]	[illegible]
*		[illegible]	[illegible]
Total		4,560	

Campbell & Calderwood, Paisley.

Name of Vessel.	Builders.	I.H.P.	Press.
H[illegible] Paddle Engines	Dundee S.B. Co., Ltd., Dundee...	[illegible]	
[illegible] Screw [illegible]	Ritchie, Graham & Milne, White-[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	
[illegible]		[illegible]	
[illegible]		[illegible]	
[illegible]		[illegible]	
[illegible]		[illegible]	

Cooper & Craig, Dundee. [illegible]

I.H.P. [illegible]

† Triple. [illegible]

Denny & Co., Dumbarton.

Name of Vessel.	Builders.	I.H.P.	Press. lbs.
† H.M.S. [illegible]	[illegible]	[illegible]	[illegible]
† [illegible] Twin Screw	[illegible]	[illegible]	[illegible]
† H.M.S. [illegible]	[illegible]	[illegible]	[illegible]
† [illegible]	[illegible]	[illegible]	[illegible]
† [illegible] Twin Screw	[illegible]	[illegible]	[illegible]
† [illegible]	[illegible]	[illegible]	[illegible]
† Mandalay, Single Screw.	Foreign	—	—

[illegible] complete sets of machinery for light [illegible] Total I.H.P. [illegible].

Dunsmuir & Jackson, Ltd., Govan.

† Hawthorn and Leslie Low	Chas. Connell & Co., Ltd.	[illegible]	
† Lyvet	Russell & Co.	2,800	
† Baron Polwarth ..	Napier & Miller, Ltd.	2,800	—
† [illegible]	Chas. Connell & Co., Ltd.	2,600	
† [illegible]	.. ..	2,800	
† Shagata	Napier & Miller, Ltd	1,400	
† Lalwath and Salwath	Greenock & Grangemouth Dockyard Co., Ltd.	700ea	
† Kamunen and Kamuta	Wm. Hamilton & Co., Ltd.	1,[illegible]ea	—
† Sculptor	Chas. Connell & Co., Ltd.	2,100	
† Coolebar and Gunbar..	Ardrossan Drydock and Shipbuilding Co., Ltd. ..	700ea	
† Glenartney	Chas. Connell & Co.	2,800	
† Crown of Toledo.. ..	Russell & Co.	3,600	—
† Glenspean	Chas. Connell & Co., Ltd.	2,800	—
	Total	40,500	

In addition to boilers for above engines, other boilers of 16,410 I.H.P. were constructed during the year.

Fishers, Ltd., Paisley.

† Semender	Scott & Sons, Bowling	380	160
† Pelerin	.. .. ..	500	160
‡‡Riverdale	John Fullerton & Co., Paisley	450	130
‡‡Saint Oran	Scott & Sons, Bowling ..	300	135
	Total	1,630	

Gauldie, Gillespie & Co., Glasgow.

* Geo. Watts & Dusit	Geo. Brown & Co., Greenock	400ea	130ea
* Lady Bacon and Lord Bacon	.. ..	500ea	140ea
* Tug	Scott & Sons, Bowling	250	130
	Total	2,050	

John G. Kincaid & Co., Ltd., Greenock.

† Beturia, s.s. Cargo Steamer	Russell & Co., Port Glasgow ..	3,100	—
† Bruce, s.s. Pass. Steamer	Napier & Miller, Ltd., Old Kilpatrick ..	3,000	—
† Santa Rosalia s.s. Cargo Steamer	Wm. Hamilton & Co., Ltd. Port Glasgow	2,700	—
† Queen Adelaide, s.s. Cargo Steamer ..	Robt. Duncan & Co., Ltd., Port Glasgow	2,680	—
† Dorothy Hough s.s. Cargo and Pass. Steamer ..	Greenock & Grangemouth Dockyard Co., Ltd., Grangemouth	1,300	—
† R.F.A. Burmah, s.s. Oil Tank Steamer ..	Greenock & Grangemouth Dockyard Co., Ltd., Greenock ..	1,230	—
† Chinde, Twin Screw Cargo and Pass. Steamer	Russell & Co., Port Glasgow	1,000	—
† San Martino s.s. Cargo and Pass. Steamer ..	Cantiere Navale Triestino, Monfalcone	800	—
	Total	15,840	

McKie & Baxter, Glasgow.—The output for the year, by Messrs. McKie and Baxter, was [illegible] I.H.P. of marine machinery.

Miller & Machie, Ltd., Glasgow.

* Skarmanly, Single Screw	Ardrossan Shipbuilding Co ..	200ea	120ea
* Columba, Single Screw	Napier & Miller	450	130
* Silver Pearl, Single Screw	Banff	150	130
* Maggie Irene, Single Screw	Inverness	150	140
* Robinson, Single Screw	Banff ..	150	130
† Bancroft, Twin Screw ..	Hepple & Co., South Shields	260	160
* Scotcher, Single Screw .	Ross & Marshall, Greenock	260	130
* [illegible] Lady Rank and Uniflorous, Single Screw	Banff	180ea	130ea
* Y[illegible] Screw	P. McGregor & Sons	220	130
† Rag[illegible] Screw	Napier & Miller ..	300	160
* Single Screw	Mechan & Sons	60	120
	Total	2,760	

In addition, repairs on fully 200 vessels have been carried out.

* Compound. † Triple. ‡‡ Compound Surface Condensing. *t* Turbine.

Muir & Houston, Ltd., Glasgow.

Name of Vessel.	Builders.	I.H.P.	Press. lbs.
† Sebastiense	Murdoch & Murray, Ltd.	400	180
† Cerminal	Greenock & Grangemouth Dockyard Co., Ltd., Grangemouth	1,140	180
† Lapwing	Mackie & Thomson, Ltd.	2,000	
* Merlin ..	..	200	120
	Total	3,840	

Rankin & Blackmore, Greenock.

† Saint Leonard, Cargo .	A. McMillan & Son, Ltd	2,700	180
† Cape Ortegal, Cargo ..	Russell & Co.	2,750	180
† Volumnia Cargo ..	..	3,300	180
† Highland Warrior, Passenger Steamer	..	3,000	210
† Saint Bede, Cargo	..	2,700	180
† Essex Abbey, Cargo	Greenock & Grangemouth Dockyard Co., Ltd. ..	2,100	180
	Total	18,600	

James Ritchie, Partick.

‡‡Zetlich, Coaster .	Wm. Walker, Maryport	400	130
‡‡Not known, Tug .	Riley & Hargreaves & Co., Singapore ..	200	130
‡‡Dora, Dutch Government Patrol Steamer	..	260	130
‡‡10 Small Launches ..	Shipped abroad ..	350	100to 130
	Total	1,210	

A. Rodger & Co., Govan.

† Robert Dallar ..	A. Rodger & Co., Port Glasgow	2,750	
† Baron Sempill	.. .. ..	1,100	
† Glenslay ..	.. ..	1,800	—
	Total	5,650	

Ross & Duncan, Govan.

During the year 1911, Messrs. Ross & Duncan constructed and fitted on board screw vessels on the Clyde, 13 sets of machinery, aggregating 8,500 indicated horse-power, and shipped abroad 31 sets, aggregating 6,680 indicated horse-power, making a total output for the year of 44 sets of 15,180 I.H.P. In addition to the boilers for these sets, Messrs. Ross and Duncan constructed for home and abroad 7 boilers of 2,000 I.H.P.

David Rowan & Co., Glasgow.

*fd*Chenab, S.S...	Cammell, Laird & Co., Ltd.	2,500	—
*nd*Amphion, S.S.	Campbeltown Shipbuilding Co.	1,850	—
*nd*Lauderdale, S.S. ..	,, ,,	950	—
*fd*Kaiser Franz Josef I., T.S.	Cantiere Navale Triestino	13,000	—
*td*Teregestea, S.S.	,, ,, ...	2,350	—
*fd*Stephano, S.S.	Chas. Connell & Co., Ltd. ..	3,600	—
*nd*Saint Stephen, S.S. ..	Wm. Hamilton & Co., Ltd	2,200	—
*nd*Lord Lonsdale, S.S. ..	,, ,, ..	2,500	—
*nd*Tola, S.S.	Arch. McMillan & Son, Ltd	2,250	
*nd*Baron Erskine and Calcutta, S.S.	,, ,,	2,900ea	—
*nd*Mont Cenis, S.S... ..	Napier & Miller, Ltd...	1,950	
*nd*Trafalgar, S.S.	Russell & Co.	2,600	—
*td*Kirkfield, S.S.	,, ...	3,000	
*fd*Den of Airlie, S.S. ..	,, ...	3,550	
*nd*Wirral, S.S.	,, ...	2,450	—
*fd*Hurunui, T.S.	,, ...	7,500	—
	Total	58,050	

Also 28 Boilers for shipment—11,800 I.H.P.

Speedwell Iron Works (W. V. V. Lidgerwood), Coatbridge.

† Guanabara, Single Screw	Dundee Shipbuilding Co	650	180
† Antartico, Single Screw	,, ,, .	525	180
† Sets for Fishing Vessels, Single Screw	Smith's Dock Co. . .	3,820	180
† Koning Albert, S.S. ..	Mackie & Thomson, Ltd. . .	420	180
† Furze, Gorse, Lichen, Moss, Reed, Honey Dew, Walkerdale, and Darda, S.S. ..	Mackie & Thomson, Ltd. .. .	280ea	180ea
† Ustica, Pantelleria, and Lampedusa, S.S. ..	,, . .	600ea	180ea
† Bargany and Balvenie, Single Screw	Greenock & Grangemouth Dockyard Co., Greenock ..	850ea	180ea
† Corn Rig and Rig, Single Screw	Mackay Bros., Alloa	280ea	180ea
† Austral, Single Screw	.. . .	850	180
† Crathie, Single Screw	J. Duthie, Torry, Aberdeen	450	180
† Speedwell V, Impregnable and Andrina, Single Screw	,, ,, ..	280ea	180ea
† Copan, Single Screw .	,, ,, .	450	180
† Damied, Single Screw	. ,, ..	600	180
	Total	14,605	

IRISH.

Dublin Dockyard Co., Dublin.

Name of Vessel.	Built of	Owners.	G.T. Regis.	G.T. inclu. reect.	I.H.P.
† Chelohsin, twin-screw passenger steamer ..	.. Steel	Canadian	1,134	Net537	1,500
* Enda, cargo steamer ..	.. ,,	British	842	Net396	950

* Compound. † Triple. ‡‡ Compound Surface Condensing. *fd* Compound Non-Condensing, Tandem Diagonal. *nd* Tandem Diagonal.

Harland & Wolff, Ltd., Belfast.

Name of Vessel	Built of	Owners	G.T. Regis.	G.T. inclu. erect.	I.H.P.
* Dunvegan Castle, Triple-screw	Steel	British	[illegible]		[illegible]
* Galway Castle, Twin-screw		,,	[illegible]		[illegible]
* Nomadic, Twin-screw		French	[illegible]		
* Traffic, Twin-screw ..			[illegible]		[illegible]
* Lord [illegible], Twin-screw		British	[illegible]		[illegible]
* Zealandic, Twin-screw		,,	[illegible]		[illegible]
Patricia, Twin-screw			[illegible]		[illegible]
* Devanha, Twin-screw			[illegible]		[illegible]
* Alnwick, Triple-screw		,,	[illegible]		[illegible]
* Demerara, Twin-screw		,,	[illegible]		[illegible]

Larne Shipbuilding Co., Larne.

Line barge	Steel	British	100		
* No. 61 steamer			[illegible]		[illegible]

Workman, Clark & Co., Ltd.

* Andrias, Twin-screw Draught	Steel	British	[illegible]		6,000
Nelson			[illegible]		5,000
Mauretania			[illegible]		[illegible]
* Vandyck			[illegible]		7,000
* Thrixos			[illegible]		3,800
* Cattilo			[illegible]		3,800
* Stavella			[illegible]		[illegible]
* Ligia			[illegible]		6,500
* Lusitania			[illegible]		[illegible]
Wanderer			[illegible]		[illegible]

Engines by the same Company.

LIST OF VESSELS ENGINED IN 1911.

MacColl & Co., Ltd., Abercorn Basin, Belfast.

Name of Vessel	Builders	I.H.P.	Press. lbs.
* Chichester, twin-screw passenger	Dublin Dockyard Co.	1,400	18[illegible]

FRENCH.

Ateliers et Chantiers de France, Dunkirk.

Name of Vessel	Built of	Owners	G.T. Regis.	G.T. inclu. erect.	I.H.P.
* La Bassure de Baas, steam dredger		French	[illegible]		700
* Nord, steam dredger		,,	[illegible]		700
* La Bayonnaise, cargo boat			[illegible]		1,100
* Vulcain, cargo boat			[illegible]		1,000
* Bosphore et Canal Bosphorus 7 passenger boats		Turkish	[illegible]		[illegible]
* Afrique, cargo boat		French	2,460		[illegible]
Yvonne Agel, cargo boat			4,700		[illegible]
Phebe, cargo boat		Algerian	[illegible]		[illegible]

All engined by the same Company.

Baheux freres, Boulogne-Sur-Mer.

* Saint Pierre, steam trawler		Boulogne	79		180
* L'Afrique, steam trawler			[illegible]		710
* Yvonne, steam trawler ..			[illegible]		200

Chantier Cockerill, Hoboken.

* Constantin le Burlet	Steel	Foreign	[illegible]		
* 2 Stern-Wheeler			[illegible]		220
* Delivrance IX, Stern-wheel			[illegible]		[illegible]
* Delivrance X, Stern-wheel			[illegible]		[illegible]
* Luxembourg, Stern-wheel			[illegible]		180
Motor boat			[illegible]		[illegible]
* Cambrai, tug			[illegible]		[illegible]
Barges			[illegible]		
Barges			[illegible]		
1 Barge			[illegible]		
2 Barges			[illegible]		
1 Lighter			[illegible]		

Lighters, Steamboats and Whale tug of different dimensions.

Chantiers de l'Atlantique St. Nazaire.

* Rochambeau, packet boat	Steel	French	[illegible]		[illegible]
Mont Vis, cargo boat			[illegible]		[illegible]

Engined by same Society.

Chantiers de Normandie, Grand Quevilly, Rouen.

* Headlaga, twin-screw packet boat		Peru	[illegible]		[illegible]
Barge	Steel	French	[illegible]		—

Atlas tender, tug for the French Admiralty.

Maurel freres, Bordeaux.

* Tendaba, river cargo boat		Dakar	[illegible]		200

Cie des Messageries Maritimes, Paris, France.

* Peel Loeat, Packet Boat		Foreign	[illegible]		[illegible]

Messageries Maritimes, La Ciotat.

* Peel Loeat, packet boat	Steel	French	[illegible]		[illegible]

Augustin Normand, Le Havre.

* Cavalier, destroyer		French	[illegible]		[illegible]
* Boucher, destroyer			[illegible]		[illegible]
Coastguard			[illegible]		[illegible]
1 Lifeboats	—		Total [illegible]		—

* Triple Turbine. * Compound. [illegible] * Triple. [illegible] High-Pressure. * Compound. Triple. [illegible] Turbine.

Ste. Anon. Des Chantiers et Ateliers de La Gironde, Bordeaux.

Name of Vessel	Built of	Owners	G.T. Regis.	G.T. inclu. erect.	I.H.P.
* [illegible] cargo boat			[illegible]		[illegible]
* Concorde, Triple-screw			[illegible]		[illegible]
* Bergmann, [illegible]			[illegible]		[illegible]

Ste. Anon. Des Chantiers et Ateliers de Provence, Port De Bouc.

Emagad, Packet Boat		French	[illegible]		[illegible]
Lachouna, Cargo boat			[illegible]	[illegible]	500

Engined by the same Company.

Schneider & Co., Creusot.

S.C. 2, Submersible			300	—	—
S.C. [illegible] Submersible			[illegible]		

Engined by same Company.

LIST OF VESSELS ENGINED IN 1911

Ste. Anon. Des Chantiers et Ateliers de la Lute, Le Havre.

Name of Vessel	Builders	I.H.P.	Press.
Ville de Bordeaux, and Ville d'Oran, cargo boats	Forges et Chantiers de la Méditerranée, Le Havre	[illegible]	
Richard Wadlington, pilot vessel		[illegible]	
Eugene Potron, pontoon		[illegible]	
Issa-Reis, gunboat		[illegible]	

BELGIAN.

Antwerp Engineering Co., late Chantiers Navals Anversois, Hobokon.

Name of Vessel.	Built of	Owners	G.T. Regis.	G.T. inclu. erect.	I.H.P.
* Roi Albert, S. Screw	Steel	Antwerp	[illegible]		1,900
Pax, barge	..	Nieuport			
* Olga, S. Screw		Esberg	[illegible]		[illegible]
* Polly & Rigmor, S. Screw			772ea		[illegible]
* Medina, S. Screw		Hangesund	[illegible]		[illegible]
* Thumata, S. Screw		Sydney	[illegible]		850

GERMAN.

Actien-Gesellschaft "Neptun," Rostock.

Name of Vessel	Built of	Owners	G.T. Regis.	G.T. inclu. erect.	I.H.P.
* Cette, Cargo-boat	Steel	Hamburg	[illegible]	2,260	1,100
* Westphalia, Cargo-boat ..	,,	Cöln	944	[illegible]	
* Olympos, Cargo-boat		Hamburg	[illegible]	[illegible]	[illegible]
† Taygetas, Cargo-boat ..	,,	,,	[illegible]	5,480	[illegible]
* Ynsel-Pfeil, Passenger-boat		Wismar	111	20	200
† Mailand and Turin, Cargo-boats	..	Hamburg	[illegible]	[illegible]	[illegible]
* Andras, Cargo-boat			[illegible]	5,480	[illegible]
* Bosporus			[illegible]	5,480	[illegible]
* Portici			[illegible]		[illegible]

Atlas-Werke A. G., Bremen.

* 1 Inspection Steamer		Foreign	[illegible]		[illegible]
* 3 Sternwheel Freight Steamers		German	[illegible]		[illegible]
* 1 Ice-breaker			[illegible]		[illegible]
† 1 Scavenging Tug			[illegible]		[illegible]
* 1 Steam Launch					[illegible]
1 Motor Boat					[illegible]
6 Lighters		Foreign total [illegible]			

Engines by same Company.

Blohm & Voss, Hamburg.

Pekin, Sailing Ship ..	Steel	Hamburg	[illegible]		
Passat, Sailing Ship	..		[illegible]		
Cap Finisterre, Twin-screw Passenger Steamer	..		[illegible]		[illegible]
Goeben, Battleship-Cruiser for the German Navy					

Bremer Vulcan, Vegesack.

* Berenger		Bremen	[illegible]	—	[illegible]
* Wiegand			[illegible]		[illegible]
* Furst Bulow		Hamburg	[illegible]		4,000
* Santa Theresa			[illegible]		[illegible]
* Lisan			[illegible]		
* Kismet		Bremen	[illegible]		1,400
* Uckermark		Hamburg	[illegible]		[illegible]
* Pindos			[illegible]		[illegible]
† Erymanthos			[illegible]		[illegible]
* Miansa			[illegible]		
† Kulebu			[illegible]		
* Altair		[illegible]	[illegible]	—	[illegible]
Grunewald		Hamburg	[illegible]	—	
* Ursula, Barge		[illegible]			[illegible]

Gustav Fechter Schiffswerft, Konigsberg.

Lamauria	Steel	Auslau	[illegible]		
Zutlaka		Libau	[illegible]		[illegible]
[illegible]		Konigsberg	[illegible]		[illegible]
Fortuna			[illegible]		[illegible]
Konigin Luise		Libau	[illegible]		[illegible]
Gerti			[illegible]		[illegible]
Lagg I			[illegible]		[illegible]

* Motor. [illegible] Triple. [illegible] * Compound. [illegible] Quadruple.

Flensburger Schiffsbau Gesellschaft.

Name of Vessel	Built of	Owners	G.T. Regis.	G.T. mchn. erect.	I.H.P.
[illegible]	Steel	Hamburg	[illegible]		
[illegible]		Bremen	[illegible]		[illegible]
[illegible]		Mulheim			
		Riga			[illegible]
[illegible]			[illegible]		[illegible]
Adelaide	,,	Hamburg	5,898	—	4,000
[illegible]			[illegible]		1,000
[illegible]			[illegible]		[illegible]
[illegible]		Bremen	[illegible]		[illegible]
[illegible]		Hamburg	[illegible]		[illegible]
[illegible]		Wesperde	[illegible]		1,400
[illegible]	..	Hamburg	[illegible]		1,000

J. G. Hitzler, Lauenburg Elbe.

[illegible]	Steel				
[illegible]					
[illegible]					
[illegible]					
[illegible]					

R. Holtz, Harburg-Elbe and Hamburg.

[illegible]	Wood	Foreign	21		102
[illegible]			[illegible]		4
[illegible]	Steel		[illegible]		81
[illegible]			127		1,881
[illegible]			[illegible]		
[illegible]			34		48
[illegible]	..				180
[illegible]					

J. W. Klawitter, Danzig.

Motor Motor Launch	Steel	German	[illegible]		[illegible]
Uran, Petroleum Lighter ..	,,	,,	[illegible]		
[illegible] Passenger Steamer			[illegible]		170
[illegible]	Wood		[illegible]		
[illegible] Transport Boat	Steel	..	144		

Engines by same firm

Werft D. W. Kremer Sohn, Elmshorn.

2 Barges	Composite	Wood	Home and abroad	22	
2 Lighters	Steel	..		70	
Steam Tug, Single Screw ..	,,	,,		24	—	80
2 Sail Boats	Wood			12		
Motor Vessels	Steel			96		
2 Vessels [illegible]				[illegible]		600ea
2 Repair Boats				11		
2 Rowing Boats	Wood	..				

Fried. Krupp A.G. Germaniawerft, Kiel.

Catamaran and Jinny Fat-[illegible] Boats		Argentine		displ. [illegible]	18,000ea
[illegible] Torpedo Boats		Germany			
U-Submarine					
U-[illegible]					
* River Gunboat		China		displ. 140	500

C. Luhring, Brake, Oldenburg.

Friedrich Schooner	Steel	Brake	102		
[illegible] Dutter		Elsfleth	118		0
Friedrich Schooner		Rendsburg	134		
Schwalbe Schooner		Hamburg	118		
Meta Schooner		Brake	134		
[illegible] Schooner		Barssel	143		

North German Lloyd, Bremerhaven.

Holstein, Cargo Steamer	Steel	Bremen			2,800
† Nordstern Tugboat					450

J. L. Meyer, Papenburg.

* Borkumriff Lightship	Steel	German	400		200
Westerems Lightship					
* Air Tug					100
* Stavelberg Steam Fishing Boat			166		100
* Ravensberg			168		100
* Eider			167		100
H D VI. Dredger			17		10
* Stadt Dortmund XIII. Tug			72		150
Yard No. Bro. Excavating Dredger			111		90
* Stadt Dortmund XIV. Tug			72		150
* Sao Gabriel, Tug	,,	Rio Grande do Sul	150		350
Petroleum Lighters			160ea		—
* Yard No. [illegible] and [illegible] Steam Launches	..	Argentine	700		200ea
* [illegible]	Wood	Tocopilla	20		60

Engines by J. L. Meyer

Reiherstieg Schiffswerft und Maschinenfabrik, Hamburg.

[illegible] Lady Lohden, Cargo-boat ..	Steel	Hamburg		3,160	1,450
10 Lighters				—	—
a Henny Woermann, Pass. and Cargo Steamer ..	,,	,,	—	6,062	3,700

Rickmers Rusmuhlen, Rhederei & Schiffsbau A.-G., Bremerhaven.

† Anne Rickmers, Tramp Steamer		Bremerhaven	4,08[illegible]		1,600
Ursula Rickmers Tramp Steamer			4,18[illegible]		1,600
Hansa Ingeborg Pilotboat		Brake	[illegible]		—

† Triple. * Compound. [illegible] Oil Motor. a Quadruple.

Sachsenberg Bros., Ltd., Rosslau.

Name of Vessel	Built of	Owners	G.T. Regis.	G.T. mchn. erect.	I.H.P.
Strassburg, Steamer		Hamburg	[illegible]		600
† Albatros, Steamer		..	365		600
* Perthes, Steamer		Koln	200		300
* Deutschland, Steamer		Halle o. S.	70		140
* Herzog Wittekind, Steamer		..	124		300
Nos. 661-666, 6 barges		Emden	28		
No. 667, 1 barge		..	28		
Sachsen, Steamer		Hamburg	492		600
Pontoons		Koln			
1 Pontoon		Bonn			
* Rudolf Ferves, Steamer		Bremen	256		500
* Konig Albert, Steamer		Homberg o. R.	518		1,200
* Kurfurst, Steamer		Hamburg	340		680
No. 676, Dredger .. .. —		,,	146	—	64
No. 678, Lighter		..	799		
Dyah, Steamer		Molundu	111		100

F. Schichau, Elbing and Danzig.

Vessels built gross registered tons, 10,297; I.H.P., 181,200.

Schiffwerft von Henry Kock A.-G., Lubeck.

† Lisboa	Steel	Oldenburg		2,208	1,050
† Las Palmas	,,	,,		2,245	1,050
† Lubeck	,,	,,		2,245	1,050
† Porta ..	,,	Hamburg		1,282	850
† Mosel	,,	,,		1,182	750
† Melilla ..	,,	Oldenburg		2,248	1,050
e Dock II	,,	Lubeck		1,400	

Schiffswerfte und Maschinenfabrik (Vorm. Janssen & Schmilinsky). A. G., Hamburg.

* Süd Amerika VI., Tug ..	Steel	German		151	475
* Westtal Kohlenkontor IV., Tug	,,	,,	—	34	160
* Tanfield, Tug	,,	,,		59	278
* Dia Aubel, Tug	,,	,,	—	99	300
* Fairplay X., Tug	,,	,,	—	165	450

Stettin Maschinenbau A. G., Vulcan, Hamburg.

x Steiermark, Steamboat ..	Steel	Hamburg	—	4,000	2,600
x S304-309, 6 Torpedo Boats	,,	Kiel	--	2,240	
t x River Gunboat	,,	Shanghai	—	200	650

Those marked x were built at Stettin, the others at Hamburg.

Stettiner Oderwerke, Stettin.

† Spuler 2, Suction Dredger	Steel	Harburg	550		950
† Bagger 3, Dredger ..	,,	,,	440		250
† Irmgard, Cargo Vessel	,,	Hamburg	867		650
† Stahlhof, Cargo Vessel	,,	Stettin	1,459		650
Zunz, Cargo Boat ..	,,		344	—	—
† Peterhof, Cargo Vessel	,,	,,	1,459	—	650
† Falk, Cargo Vessel ..	,,	,,	1,485	-	650
* Erico, Cargo Vessel	,,	Hamburg	391	-	300

Engines by Stettiner Oderwerke

Joh. C. Tecklenborg A.-G., Geestemunde.

a Arsterturm	Steel	Bremen	5,300		2,700
† Fremantle	,,	Hamburg	7,600		3,000
† Schildturm	,,	Bremen	5,900		2,700
t Altmark	,,	Hamburg	5,700		2,700
† Preussen	,,	Oldenburg	383		450
† Albany	,,	Hamburg	7,600	—	3,000
† Mannheim	,,	,,	7,600	-	3,000

All engined by same firm

J. H. N. Wichhorst, Hamburg.

* J. Storck	Steel	Hamburg	100	---	140
* 2 Ferry Boats	,,	,,	120ea	--	250ea
* Sperber	,,	,,	40	-	150

All engined by J. H. N. Wichhorst

Gebr. Wiemann, Brandenburg a.H.

13 Vessels totalling I.H.P. 2,750.

Caesar Wollheim, Breslau.

25 Vessels	Steel		6,063		

Some of these vessels engined by same firm.

AUSTRIAN.

Cantiere Navale Triestino, Monfalcone.

Name of Vessel	Built of	Owners	G.T. Regis.	G.T. mchn. erect.	I.H.P.
† San Marco, Pass. Vessel ..	Steel	Austrian	480	---	850
† Tergestea, Cargo Vessel ..		,,	2,732		2,000
a Kaiser Franz Josef I., Atlantic Liner ..			12,567	—	12,000
2 Lighters		,,	152ea		—
2 Lighters		,,	220ea		

Marco M. Martinolics, Lussinpiccolo.

* Slavia, Passenger	Steel	Ponte	—	240	500
km Mariska, Auxiliary Schooner		Fiume		270	100
dm Passenger		Brioni		120	350
km Lago, Molo Scampo, Fishing Boats		Vegha		20	20

† Triple. * Compound. e Triple-expansion.
t Turbine. a Quadruple. km Kromhout Motors
dm Diesel Motor.

Stabilimento Tecnico, Triestino.

Name of Vessel	Built at	Owners	G.T.	I.H.P.
Zrinyi, Battleship				
Zagreb, Motor Lighter				
Motorboat I. Twin Screw				
Motorboat				
Arabia, Motorboat				
Lighters				
Dampfmaschinen Cargoboat				

HUNGARIAN.

Ganz & Company, Budapest.

Name of Vessel	Built at	Owners	G.T.	I.H.P.
Ichigeto, Lighter		Bruck		
Gyorgy, Lighter				
I. K. N. I. Lighter				
Postas		Budapest		
M. F. R. Towing Boat				
Ichigeto, Lighter		Budapest		
Lighters		Budapest		
Lighters				
Bogi, Screw Steamer	Steel	Italy		
Lighter		Braila		
Lighters		Budapest		
Steamers and Lighters		B. R. I.		

Der Altofner Schiffswerfte der Donau Dampfschiffahrts Gesells., Budapest.

Barges	Steel			

THE NETHERLANDS.

The Arnhem Co., Arnhem.

Dredgers, steel gravel dredger, steel bunker barges, sand barges, steel bunker barge, steel dredger, steel sectional barge, steel sectional barge, steel bunker barge, I.H.P.

Naami Venn Scheepsbouwerf "Baanhoek," Sliedricht.

Name of Vessel	Built at	Owners	G.T.	I.H.P.
Haverbeurs I. Steamship				
2 Hopper Barges				
Hopper Barge				
2 Hopper Barges .. .. —	Italy			
Motor				
Hopper Barge		Sliedricht		
2 Steamships		Amsterdam		
2 Hopper Barges		Sliedricht		

H. H. Bodewes, Millingen.

Iciena	Steel	Duisburg	—	875	—
Zwarte Noten & Lous Noten		Kaiserslautern			
Berg Vlaanderen		Mannheim			
Vorwärts		Mainz			

Wed. C. Boele & Son, Holland.

Lorenna, Tug		Rotterdam		
Lorenna, Tug		Rotterdam		
Lilliphus, Tug		Rotterdam		
Motorboat, Tug		Motzen		
Lighter				
Motorboat, Lighter		Rotterdam		
Lighter, Lighter				

Bonn & Mees, Rotterdam, Holland.

Lorenzo	Steel	Rotterdam		600
Pilot, Tug				
Lorenzo, Tug		France		
Several small tugs				

Gebr. Boot.

Barge				
Motor Barges				
Tank Barges				
Swing Barge				
Swing Barge for Herring.				
Floating Pontoon				

Maatschappij voor Scheeps-en Werktingbouw Fijenoord, Rotterdam.

Nord Holland, Cargoboat	Steel	Dutch		
Limburg, Cargoboat				
Kroer, Tug				
Sleepboat V. Dredger				
Lighters				
Lombok, Cargoboat				
Amsterdam, Schuitenzuiger				

D. Goedkoop, Jr., Amsterdam.

Lighters	Steel			
Dredging Boat				
Floating Workshop				
Passenger Boat				
10 Barge Lighters				
Tender	Wood & ..			
Twin Lighter				
Various Lighters and Little Lighters, Kerkrade				

De Groot & Looyen, Gorinchem.

K. J. Koopman, Dordrecht.

Name of Vessel				
Regina				
Vessel, Tug				
Scharang, Tug .. .. —			—	—
Vessel, Steamship				
Henrietta, Tug				
Motor Steamship				
H. D. M. VIII, Tug				
H. D. M. IX, Tug				
Steamship				

N. V. Machinefabrik, Delftshaven.

Lighter, Tug and Tug	Steel			
De Zwaan, Tug				
Gerard IV., Tug				
Arnhem, Tug				
Tug, Tug				
Arnhem, Pay Steamer				
Tug				
Tug				
Hulk				

Gebr. Pot, Ridderkirk.

Barge	Steel			
Hopper Barge				
Lorna, Sailing Steamship				
Carlien, Lighter				
Motor Lighter				
Crane Pontoon .. .. Rotterdam				
Vessel, Lighter				
Crane Pontoon				
Lange I. & II. Motor Lighter				
Barges				

N. N. Werf vh Rykee & Co., Rotterdam.

Noord Holland, Cargo Steamer	Steel	Rotterdam		
Amur, Cargo Steamer		Amsterdam		

The Royal "Schelde" Shipbuilding & Engineering Co., Flushing.

Zwaluw, Complete Ship				
Albatros, Complete Ship				
Bulhond and Jakhals, Tug				
Steamship for Denmark				
Orange-Nassau, Mail Steamer				
Motorship, Cargoboat				
Nassau, Steamship				

Jan. Smit Czn, Alblasserdam.

Vesta, Rhine Lighter				
Vessel, Hopper Steamer				
Noordzee, Crane Pontoon				
Vessel, Lighter and Elevator Barge				
Estafette X., Motor Barge —	Utrecht			
Zuid Holland, Cargo Steamer				
Brunswik, Cargo Steamer				

J. U. Smit Werf de Noord, Alblasserdam.

Lighter	Steel			
16				
Zomerdijk				

J. & K. Smits, Scheepswerven, Kinderdijk.

Barge and Cargo Steamer				
Lighter				
Vessel, Lighter				
III. Rhine Cargo Steamer				
Jongerd XVI. Rhine Cargo Steamer				
Motor Barge				
Max, Service Steamer				
Gerard de Temple, Suction Hopper Dredger				
Steel Anderlan VI. Rhine Cargo Steamer				
Motorship, Steamship, Lighter Dredger				
Steamship				
Noord Holland, Cargo Steamer				
Werf Kroer Pontoon				
Friesland, Service and Barge				
Dredger				

A. F. Smulders, Schiedam, nr. Rotterdam.

Screw propelling Suction Dredger	Steel			
Stationary Floating Dredger				
Floating Crane				
Hopper Barge				
Dredger				
Crane				80
Steamship, Lighter				
Steamship, Hopper Barge				
Stationary Floating Crane				
Steamship, Steamship, Steel Barge				
Barge				

W. F. Stoel & Zoon, Alkmaar.

Motor Vessel				
Lighter				
Steamship, Steamship				
Steamship, Barge				

* Compound Engine. ‡ Motor. † Triple Compound.

A. Vuijk & Zonen, Capelle, nr. Rotterdam.

Name of Vessel	Built of	Owners	G.T. Regis.	G.T. inclu. erect.	I.H.P.
Luna, Raised quarter-deck Screw Steamer	Steel	Glasgow	1,416		850
Netherlands, Aux. 2-mast Motor Schooner		Newfdld	6,1		150B.H.P.
Luna, Shelter-deck Screw Steamer	Steel	Amsterdam	1,574		900
3 Lighters, for use on river Weser		Bremen	1,110		
Lighters, for use on river Weser		Minden	1,110		
3 Lighters, for use on river Rhine		Dutch	765		
2 Lighters, for use on river Rhine		German	768		
2 Lighters, for use on river Rhine		Dutch	418		
Adam, Lighter, for use on river Rhine		German	750		
No. 18, Lighter, for use on river Rhine		Belgian	818		
3 Fishing Vessels, 2-mast Luggers		Dutch	390		
2 Barges, for use on river Thames		London	270		

LIST OF VESSELS ENGINED IN 1911.

Alblasserdamsche Machinefabrik, Alblasserdam.

Name of Vessel.	Builders.	I.H.P.	Press. lbs.
Wagenveerboot I., Ferry Boat	Bonn & Mees	—	—
*†6 Cargo Boats	Jonker & Stans	310ea	160ea
*†Beverwyk, VII., Suction Dredger	J. & K. Smit		180
† 2 Tugboats (Old ship)		190ea	180ea
Francisca, Tug Boat	Wed. C. Boele & Zoon	260	180
Nicolaas, Tug Boat	Jonker & Stans	340	180
Hercules, Tug Boat	Ned. Scheepsbouw-My	500	120
Pr. Armand Grisar, Tug Boat	Gebrs. v.d. Windt	200	180
Tendaba, Cargo Boat	Jonker & Stans	230	120
Entreprise, Tug Boat	Wed. C. Baele & Zoon	190	180
Eylau, Trawler	Bonn & Mees	500	200
Marseillais 12 and 19, Tug Boats	Wed. C. Boele & Zoon	180ea	170ea
† Porto Alegre, Passenger Steamer	Jonker & Stans	12,00	370
Goyaz, Pass. Steamer	Gebrs. Pot	1,200	370

Machinefabrik Kinderdijk, Kinderijk, Holland.

Name of Vessel.	Builders.	I.H.P.	Press. lbs.
* No. 6, Paddle Steamer	T. & R. Smit's Scheepswerven	450	120
* Hollandsdiep, Bucket Dredger	,, ,,	250	120
* Max, Launch	,, ,,	50	120
† General du Temple, Suction Dredger	,, ,,	450	180
† Stad Amsterdam 6, Cargo Boat	,, ,,	160	180
* Merwede and Smalland, Bucket Dredgers	,, ,,	250ea	120ea
† Schvueven & Noord-Beveland, Passenger Steamers	,, ,,	400ea	180ea
† Tritone, Barge Suction Dredger	,, ,,	550	180

Netherlands Engineering Co., Amsterdam.

a Koningin der Nederlanden, Twin-screw Mail Steamer	Nederl. Scheepsbouw Maatschappy		7,000	215
* Pieter Goedkoop, Tug	Werf 't Kromhout		450	120
† Calypso, Cargo Boat	Nederlandsche Scheepsbouw My		1,350	180
† Medusa, Mine Layer	Naval Yard		950	180
† Hydra, Mine Layer	Naval Yard		950	180
† Van Cloon, Passenger Steamer	Nederlandsche Scheepsbouw My		3,500	180
dm Sembalan, Cargo Boat	,, ,,			200B.H.P.

The Royal "Schelde" Shipbuilding & Engineering Co., Flushing.

† Palembang, Cargo Boat	Bonn & Mees	Rotterdam	3,500	200
* Zuid-Holland do	J. Smit,	Alblasserdam	1,000	180
† Brunswyk, do	,,	,,	1,200	160

NORWEGIAN.

Akers Mek Verksted, Kristiania.

Name of Vessel.	Built of	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
† Tulla (Steam, Steel)	Norwegian		546	-	700
* Lurstad (,, ,,)	,,		966		900
† Ek (,, ,,)	,,		995	-	850
* Klem (,, ,,)	,,		156		500
† Selvik (,, ,,)	,,		141		450
† Flamme (,, ,,)	,,		187	—	500

† Triple. *dm* Motor. * Compound. *a* Quadruple.
*† Compound Triple.

Akers Mek Verksted, Kristiania. *continued*

Name of Vessel	Built of	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
† Bransfield and May (Steam, Steel)	Norwegian		158ea		500ea
† Ingeborg I. (,, ,,)	,,		160		500
† Nos. 527, 91, & 915 (,, ,,)	,,		170ea		700ea
Crathens (,, ,,)	Brazil		1,467		1,000
Helena (,, ,,)	,,		108		300
Hanka (,, ,,)	British		110		328
Hupa & Horta (,, ,,)	,,		109ea		328ea
Cachalot (,, ,,)	Newfdld		106		328

Engines by the same Company.

A S Bergens Mek. Værkstad, Bergen.

† Commodore Rollins, Fruiter (Steel)	Bergen		1,577		1,820
† Ursa, Cargo (,, ,,)	,,		958		800
† Hosanger, Cargo (,, ,,)	,,		1,620		990
† Granat & Harpun, Whalers (,, ,,)	Sandifjord		189ea		480ea

Engines by same firm.

Christiansand Mekaniska Værksted, Christiansand.

* Fara, Passenger Steamer (Steel)	Farsund			66	65
* Tinn, Passenger Steamer (,,)	Skien			169	251
† Blink, Whaler (,,)	Sandifjord				ca350

Framnæs Mekaniske Værksted, Sandifjord.

† Norrona, Whaler (Steel)	Sandifjord		170		500
† Nyr and Don Luis, Whalers (,, ,,)	,,		128ea	-	350ea
† Minerante Zoni, Whaler (,, ,,)	,,		180	—	500

Laxsevaags Maskin & Jernskibsbyggeri, Bergen, Norway.

† Ull, Flush-deck (Steel)	Bergen		998	1,138	650
† Luna, Quarter-deck (,, ,,)	,,		741	959	650
† Hestmanden, Spar-deck (,, ,,)	Stokmarknees		921	979	850
† Galatea, Flush-deck (,, ,,)	,,		abt 998	abt. 1,138	650

Engined by the same Company.

Nylands Værksted, Christiania.

† Concetena di Giorgio, Cargo Steamer (Steel)	Norway			1,608	1,500
† Mariei di Giorgio, Cargo Steamer (,, ,,)	,,			1,611	1,500
† Njäli, Whaler (,, ,,)	Iceland			137	425
† Bruse, Cargo Steamer (,, ,,)	Norway			1,711	900
† Normann I. Whaler (,, ,,)	,,			135	400
† Varde, Pass. & Cargo Steamer (,, ,,)	,,			175	350
† Hogni, Whaler (,, ,,)	Iceland			180	400
† Rigi, Cargo Steamer (,, ,,)	Norway			abt 1,800	1,100
† Snar, Whaler (,, ,,)	,,			115	280
† Ole Wegger and Odd II., Whalers (,, ,,)	,,			177ea	500ea
Campbell & Sorell, Whalers (,, ,,)	Tonsberg			ab 135ea	400ea

Engines by same firm.

Porsgrunds Mek. Værkstad, Porsgrund.

† Ronashill, Whaler (Steel)	Norwegian		164	—	470
* Nils, Tug Boat (,, ,,)	,,		22	—	100
† Fynd, Whaler (,, ,,)	,,		165	-	440
† Grenland, Passenger (,, ,,)	,,		356	- -	430
† Kauru, Whaler (,, ,,)	,,		158	-	440
* Union IV., Cargo (,, ,,)	,,		-	170	160
† Heard, Whaler (,, ,,)	,,		- -	160	440

SWEDISH.

Oskarshamns Mekaniska Verkstads Och Skeppsdocka Aktiebolag, Oskarshamn.

Name of Vessel.	Built of	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
* Marisberg, Tugboat (Steam, Steel)	Sweden		41	—	100
† Frey, Cargo Steamer (,, ,,)	,,		1,333	—	750

Engined by same Company.

DANISH.

Burmeister & Wain, Copenhagen.

Name of Vessel.	Built of	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
t Söulven, and Flyvefisken, Torpedo boats	Copenhagen		dis. 210ea	-	4,200
m Selandia, Motor Ship	,,		4,900	-	2,500
† Manchioneal and Mandeville Fruit Steamers	Bergen		1,654ea	-	1,800ea
† Miusk and Tomsk, Cargo and Passenger Boats	Copenhagen		1,220ea	-	1,000ea

Engines by same firm.

Helsingors Jernskibs-og Maskinbyggeri, Elsinore.

† Tor (Steel)	Stockholm		1,036	—	650
* Agnete (,,)	Svendborg		148	—	350
† Tula (,,)	Copenhagen		1,231	-	1,000

Engines by same Company.

Bergsunds Mek. Werkstads Aktiebolag, Stockholm.

† Osilir, Passenger Steamer (Steel)	Russia		541		700
m Vanas, Passenger Ferry (,,)	Swedish Army		25dis.		360H
* Syd, Tugboat (,,)	Russia		125dis		350
Känso, Barge for disinfection installation (,,)	Sweden		--	- -	

Engines by same Company.

† Triple. * Compound. *t* Turbine. *m* Motor.

Helsingborgs Varfs. Aktiebolag, Helsingborg.

Name of Vessel	Built at	Owners	G.T. Regis.	G.T. mech. steel	I.H.P.
* Rulan, Steel Screw Steamer, raised quarter-deck		Norway	660		1[illegible]

Engined by same firm.

Kockums Mekaniska Verkstads Aktiebolag, Malmo.

‡ Munin, Torpedo-boat Destroyer		Sweden	[illegible] tons	[illegible] B.H.P.
2 Hopper Barges				
1 Dock Caisson				

Engines supplied by same Company.

LIST OF VESSELS ENGINED IN 1911.

Lindholmens Verkstads Aktiebolag W. Hok, Lindholmen.

Name of Vessel.	Builders	I.H.P.	Press. lbs.
Anna Johnson, Shelter-deck	Nordstrandman	[illegible]	200
Svaman, Passenger	Hallands Tugbats A. B.	850	200

RUSSIAN.

Ste. Anon. Chantiers Navals Ateliers et Founderies de Nicolaiev, Nicolaiev.

Name of Vessel	Built at	Owners	G.T. Regis.	G.T. mech. steel	I.H.P.
‡ [illegible], Twin-screw Revenue Cruiser	Steel	Russia	about [illegible]		1[illegible]
* [illegible], Petrol Steamer			about [illegible]		[illegible]

Five second steamer engined by the same company.

FINNISH.

Maskinfabriken Alfa, Helsingfors.

12 Motor Vessels. Total 4[illegible] I.H.P.

A. B. Sandrikens Skeppsdocha-och-Mechaniska Verkstad, Helsingfors.

14 Vessels	Home & Foreign	771	1,26[illegible]

Six engined by the Company. Compound engines.

ITALIAN.

Societa Esercizio Bacini, Genoa.

Dante Alighieri	Steel	Italian	[illegible]	

Officine & Cantiere Napoletani C. & T. T. Pattison, Naples.

* P.N. Twin-screw Pattison type Torpedo Boats		Royal Italian Navy	about [illegible] tons each	

Engined by same Company.

Giovanni Poli, Chioggia.

2 Barges	Steel	Royal Navy	1,000	
1[illegible]			1,000	

Soc. Anon. Veneziana Industrie Navali e Meccaniche, Venice.

* Gondola, Passenger Coast-Steamer				70

SPANISH.

Compania Euskalduna de Construccion y Reparacion de Buques, Bilbao.

* Upper-deck Turret	Steel	Spain	about [illegible]	

AMERICAN.

The American Car & Foundry Co., Wilmington, Del.

Name of Vessel	Built at	Owners	G.T. Regis.	G.T. mech. steel	I.H.P.
Storm King, Steam Lighter	Wood	New York		780	
No. 4, [illegible] 47 and 48					
Car [illegible]					
J. A. Pelletier, Fishing Steamer		[illegible]		282	
No. 27, 28, Dumping Scows				[illegible]	
No. [illegible] and 11				[illegible]	
No. 42 and 50				[illegible]	

The Bath Iron Works, Bath, Maine.

Moosehead, High-speed Steamer	Steel	Portland, Me.	677	[illegible]
* Gondolier, Lake Composite Steamer		Naples, Me.	[illegible]	[illegible]

The Bath Marine & Construction Co., Bath, Maine.

About 190 small boats, ranging from 16 ft. to 60 ft.				
Lighter	Wood	Bath	[illegible]	4
Hopper				60
Tug				

F. S. Bowker & Son, Phippsburg, Me.

Edward R. Smith, Lighter	Wood	Boston		

The Buffalo Dry Dock Co., Buffalo, N.Y.

Pittsburgh, Loading Lighter	Steel	Cleveland, Ohio	1,[illegible]	[illegible]

Cobb, Butler & Co., Rockland, Me.

* Martin J. Murray, Steamer		Greenport, N.Y.	11	[illegible]
* Herbert N. Edwards, [illegible]			1	[illegible]

W. Cramp & Sons, Beach and Ball, Philadelphia.

* Pittsburgh, Torpedo Boat Destroyer		U.S. Navy	[illegible]	[illegible]
* Wyoming, Battleship			[illegible]	[illegible]
D. L. & W. [illegible]		New York	[illegible]	
‡ Capt. Collier, Petrol Barge		Pt. Arthur, Texas	222	[illegible] I.H.P.
‡ Cuba, Cruiser		Cuban Navy	[illegible]	[illegible]
* Patrick Gombert, [illegible]			[illegible]	[illegible]

*Compound. ‡ Turbine. ‡‡ Diesel Motor. ‡ Motor. Triple.

G. G. Deering Co., Bath, Me.

Name of Vessel	Built at	Owners	G.T. Regis.	G.T. mech. steel	I.H.P.
Martin & Hosea, [illegible] Schooner	Wood	East Me.	[illegible]		

The Detroit Shipbuilding Co., Detroit, Michigan.

City of Detroit III, Side-wheel Passenger Steel Hull	—	Detroit, Mich.	—	[illegible]
‡ Putnam Bay, Screw Wheel Passenger Steel Hull			[illegible]	[illegible]

Engines by same Company.

J. H. Dialogue & Son, Camden Co., N.J.

* The Barnett, Tug	Steel	New York	[illegible]	[illegible]
* Greenwich, Tug		Philadelphia	[illegible]	[illegible]
La Belle, Gasoline Vessel		Cleveland	[illegible]	[illegible]
* Engineer, Tug		New York	[illegible]	[illegible]
Vim, Tug (Gasoline)		Philadelphia	[illegible]	[illegible]
* Caspian, Tug			[illegible]	[illegible]
* Rebuilt Steamer New York, Passenger boat			[illegible]	[illegible]

1st, 2nd, 4th and 6th engined by same Company.

The Dubuque Boat and Boiler Works, Iowa.

* Lieut. Lewis, Stern Wheeler		Kansas City	[illegible]	[illegible]
Lieut. Gurney				
Lieut. Augustine				
Waterway		Vicksburg		

The Fore River Shipbuilding Co., Mass.

Sankaty, Passenger	Steel	New England	42	[illegible]
* New Orleans, Suction Dredge		New Orleans		[illegible]
‡ Crest, Trawler		Boston	[illegible]	[illegible]
‡ Newton, Collier			272	[illegible]
‡ Rivadavia, Battleship		Argentine Navy	[illegible] tons	[illegible]

Engines by The Fore River Shipbuilding Co.

The Gas Engine Power Co. and C. H. Seabury Co., New York.

‡ Sovereign, Steam Yacht	Steel	New York	[illegible]	[illegible]
‡‡ Thelma, Motor Yacht			141	[illegible]
‡‡ Raven, Motor Yacht	Wood		[illegible]	[illegible]
‡‡ Spojacks, Motor Launch		Cleveland	27	[illegible]
‡‡ Spray II., Motor Launch		New York	41	[illegible]
Small wooden Motor Launches from 20 ft. to 60 ft. (aggregating			[illegible]	[illegible]
‡‡ Ioneta, Motor Launch	Wood	N.Y.	[illegible]	12

Engines by same Firm.

Harlan & Hollingworth Corporation, Wilmington, Del.

‡ Westfield, Ferryboat	Steel	U.S.A.	1,2[illegible]	1,[illegible]
* California, Lumber and Pass. Steamship			est. [illegible]	1,[illegible]
Launch expected Dec. 11				
* Excursion Steamboat side wheel			est. [illegible]	1,[illegible]
Launch expected Dec. 11				
15 Cylindrical Return Tube Boilers for boats built by other parties				[illegible]
* 2 sets of Engines, Machinery and Boilers, etc., of Fishing Steamers		U.S.A.	total [illegible]	[illegible]
* 1 Compound Engine for Police and Fireboat for Philadelphia				[illegible]

All engines by same Corporation excepting excursion steamboat.

Manitowoc Dry Dock Co., Manitowoc, Wis.

Hull 42, Car Float	Steel	Chicago		
Hull 43, Dump Scow				
Commerce, Lighter	Steel		[illegible]	[illegible]
Hulls 47, 48, Dump Scows				

Maryland Steel Co., Sparrows Point, M.D.

‡ Neptune, Collier	Steel	Baltimore	[illegible]	I.H.P.
Captain Haston, hull for Pontoon Dredge			[illegible]	
* U.S. Navy Oil Barges No. 2 and 3, self-propelled		Norfolk	[illegible]	[illegible]
Frank Tenney, Tugboat		Baltimore	[illegible]	[illegible]
U.S. Navy Coal Barges No. 2, 3, 6, 7 and [illegible]		Norfolk	[illegible]	
Nelson Z. Graves, hull for a Pontoon Dredge		Baltimore	[illegible]	

The Moran Co., Seattle, Wash.

Paterson and Morton, Steam Whalers	Steel	Seattle	[illegible]	[illegible]

The Newport News Shipbuilding & Dry Docks Co., Newport News, Va.

Monaghan, T.B. Destroyer U.S. Navy Department Washington, D.C.				
Seal Schooner, Lost [illegible] for Navy Dept. Washington, D.C.				
Hermione, Frigate			1,940	2,000
[illegible] Freighter		East Mexico	[illegible]	[illegible]
Hilton, Freighter		New York	[illegible]	[illegible]
[illegible] Freight Car Ferry		Norfolk, Va.	[illegible]	[illegible]
* Virginia, Freight Car Ferry			[illegible]	
* Scow, Dump Scow				

[illegible] Scow, [illegible] Steel Barge & Tug Boat.

‡ Triple. * Compound. ‡ Turbine. ‡‡ Motor.

The New York Shipbuilding Co., Camden, New Jersey.

Name of Vessel	Built of	Owners	G.T. Regis	G.T. inclu erect	I.H.P.
[illegible]	[illegible]	U.S. Navy	[illegible]	[illegible]	[illegible]
[illegible]	Steel	Philadelphia	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	New York	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	Baltimore	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	Sol	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	Havana	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	Steel	New York	[illegible]	[illegible]	[illegible]

Perth Amboy Dry Dock Co., Perth Amboy, N.J.

[illegible] Wood New York [illegible] One [illegible]-ton Steam Derrick [illegible] Barges.

St. Tammany Shipyard, Madisonville, New Orleans, La.

[illegible] New Orleans [illegible]

D. M. Swain, Stillwater, Minnesota.

[illegible]

T. S. Marvel Shipbuilding Co., Newburgh.

Name of Vessel	Built of	Owners	G.T. Regis	G.T. inclu erect	I.H.P.
* [illegible]	Steel	New York	[illegible]	221	[illegible]
* [illegible]			[illegible]	[illegible]	[illegible]

Staten Island Shipbuilding Co., Port Richmond.

Name of Vessel	Built of	Owners	G.T. Regis	G.T. inclu erect	I.H.P.
Wildwood Ferry Boat	Steel	Camden, N.J.	761	—	700
Erie No. 27, Car Float for 12 cars	Wood	New York	[illegible]		
Kariva, Sch. Yacht	Steel		[illegible]		
James Stewart, Tugboat	Wood		[illegible]		700
P.R.R. No. 1 Tugboat	Steel	Phila., N.J.	121		450
Ellen Gessner, Launch	Wood	New York			120
S. G. Brown, Tugboat	Steel		[illegible]		[illegible]
Dixie IV. Steel Launch	Wood				[illegible]
El Toro, Gasolene Tug	Wood	—	20		72
Hull No. [illegible] Tugboat	Steel	New York	220		[illegible]
[illegible] Tugboat			229		700
[illegible] House Barges	Wood		223ea		
L.I.R.R. N.Y. Co. No. 1 House Boat			150		
Hull No. [illegible] Sand and Sugar Scows			[illegible]ea	—	
[illegible] and [illegible] Dump Scows			600ea	—	
[illegible] and [illegible] Refrigerating Scows			1,[illegible]ea		—
Owen and Church, Deck Stone Scow			115		

Union Iron Works Co., San Francisco, Cal.

Name of Vessel	Built of	Owners	G.T. Regis	G.T. inclu erect	I.H.P.
Kilauea, Single Screw Passenger and Freight	Steel	Foreign	[illegible]		[illegible]
Carp, Submarine		U.S. Navy			780

Waters-Colver Co., 45, Broadway, New York.

Name of Vessel	Built of	Owners	G.T. Regis	G.T. inclu erect	I.H.P.
* Hart's Island Steamer	Wood	New York	[illegible]		
* Riker's Island Steamer			66		
* Kensington Tug		Phila.	65		
Southwark, Tug			42		

LIST OF VESSELS ENGINED IN 1911.

The Great Lakes Engineering Works, Detroit, Mich.

Name of Vessel	Builders	I.H.P.	Press. lbs
Col. James M. Schoonmaker, Bulk Freight	Great Lakes Engineering Works	2,600	216
Pres. Scott, Self-trimmer			
E. J. Lavery and M. L. Harper, Bulk Freighters		[illegible]	[illegible]
Portsmouth,			
Bangor			
Providence			
Boston			
Lynn			
Salem			
Searsport			
Grayson, N. Bennington			
Grand Freighters		1,800ea	180ea

Maryland Steel Co., Sparrows Point, M.D.

Name of Vessel	Builders	I.H.P.	Press. lbs
City of Baltimore and City of Norfolk, Bay Boats	Maryland Steel Co.	2,[illegible]	[illegible]

The New York Shipbuilding Co., Camden, Co.

Name of Vessel	Built of	Owners	G.T. Regis	G.T. inclu erect	I.H.P.
[illegible]				12,[illegible]	
/ Chinese Cruiser				7,[illegible]	
2 Tugs		U.S.N.		1,500ea	
[illegible]					
U.S.N.				16,[illegible]	
2 Oil [illegible]				1,500ea	
1 Oil Tender				2,[illegible]	

[illegible] Triple / Turbine [illegible]
[illegible] Compound. * Turbine [illegible]

CANADIAN.

Joseph McGill, Shelbourne, N.S.

Name of Vessel	Built of	Owners	G.T. Regis	G.T. inclu erect	I.H.P.
Alice M. Pike, Sailg. Schooner	Wood	Shelbourne, N.S.			
Stanly & Frank			84		
Robert G. Cann, Steamer		Yarmouth	[illegible]		60
Dorothy G. Snow, Sailing Schooner	Wood	Digby, N.S.	[illegible]		
Ada P. Bishop and Marjorie N. Inkpen, Sailg. Schooners		Shelbourne, N.S.	[illegible]ea		

AUSTRALIAN.

Morrison & Sinclair, Balmain, Sydney, N.S.Wales.

Name of Vessel	Built of	Owners	G.T. Regis	G.T. inclu erect.	I.H.P.
Keandra, Ferry Steamer		Sydney			
Star, Steam Lighter					

LIST OF VESSELS ENGINED IN 1911.

Morts Dock and Engineering Co., Ltd., Balmain, Sydney.

Name of Vessel	Builders.	I.H.P.	Press lbs
* Belbowrie, Wood Twin-Screw	Rock Davis	260	120
† Keandra, Double-end Wood Ferry	Morrison & Sinclair	680	180

Machinery and Boilers only supplied by the Company.

JAPANESE.

The Fujinagato Yard, Osaka.

Name of Vessel	Built of	Owners	G.T. Regis.	G.T. inclu. erect.	I.H.P.
2 Trawlers	Steel		—	210ea	

The Kobe Mitsubishi Dockyard and Engineering Works, Kobe.

Name of Vessel	Built of	Owners	G.T. Regis.	G.T. inclu. erect.	I.H.P.
Fumigation Boat	Steel	Kobe	-	60	-
† Kasamatsu Maru, Tug Boat				54	180
* Kikoshima, Tug Boat		Moji		98	367
2 Fumigation Boats		Taiwan		84ea	
4 Fumigation Boats		Jinsen		60ea	- -
† Miho Maru, Tug Boat		Kobe	-	50	248
† Hashihime Maru, Tug Boat			-	82	252
† No. 1 Tomi Maru and No. 2 Tomi Maru, Steam Trawlers				240ea	450ea
* Ferry Boat				99	250
† Ferry and Tug Boat				73	250
† Tug Boat				130	340

Engines by same firm.

The Mitsu Bishi Dockyard and Engineering Works, Nagasaki.

Name of Vessel	Built of	Owners	G.T. Regis.	G.T. inclu. erect.	I.H.P.
† Canada Maru, Cargo Steamer	Steel	Osaka	—	6,063	5,073
/ Shinyo Maru, Passenger Steamer		Tokyo		13,377	21,356
/ Yamakaze, Destroyer		I. J. Navy	- -	—	—
† Tsuruye Maru		Nagasaki	- -	215	448
3 Boats	Steel	I. J. Navy		23ea	—
Motor Launch	Wood	Melbourne	- -	—	
3 Motor Launches	Steel	Vladivostock		-	ea 30B.H.P.
† No. 2 Fukutomi Maru, Trawler		Nagasaki		230	450
† Kaminoshima Maru, Steam Launch	Wood		-	25	70
/ Yahagi 2nd-class Cruiser	—	I. J. Navy		—	
† No. 224	Steel	Nagasaki		215	450
† No. 227, Trawler			-	230	450

Ono Tekko Zosengo Nakaguchi-machi Nishiku, Osaka.

Name of Vessel	Built of	Owners	G.T. Regis	G.T. inclu. erect.	I.H.P.
† Koun Maru, No. 1, Schooner	Steel	Japan	-	455	400
† Koyo Maru, Hogyo Maru, Unnamed, Fukuyu Maru, Steam Trawlers			- -	215ea	400ea
* 10 Steam Fishing Boats	Wood	—	-	25ea	50ea
† Unnamed Steam Trawler	Steel	Japan	—	215	400
* Tsurushima Maru, No. 2 Steam Launch				58	120
* 2 Steam Ferry Boats	Wood			15ea	25ea

Engines by same firm.

LIST OF VESSELS ENGINED IN 1911.

The Ishikawajima Shipbuilding and Engineering Co., Ltd., Tokyo.

2 Steel Hopper Barges.
1 Steel Pontoon for rock cutters
2 Wooden Sand Pump Dredgers
2 Steel Hopper Barges

CHINESE.

The New Engineering and Shipbuilding Works, Ltd., Shanghai.

Name of Vessel	Built of	Owners	G.T. Regis	G.T. inclu erect	I.H.P.
Chi Chuen, Tug	Steel	Chinese	[illegible]		[illegible]
6 Launches, Motor	Teak		25		120
* Launch, Steam			18		40
Oil Barge, Motor	Steel		[illegible]		50
Lighters			1,075		
Pontoon			50		

Engines by same Company

* Compound † Triple / Turbine

Messageries Fluviales de Cochin China, Saigon.

Name of Vessel.	Built	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
* [illegible]				[illegible]	

Engines by same firm.

HONG-KONG.

The Taikoo Dockyard and Engineering Co. (of Hong-Kong), Ltd.,

Name of Vessel.	Built	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
* [illegible]	Wood		[illegible]		[illegible] I.H.P.
[illegible]	Steel	[illegible]	[illegible]		[illegible]
* [illegible]		Hong-Kong	[illegible]		1400
[illegible]		[illegible]	[illegible]		[illegible]
* [illegible]	Wood	[illegible]	[illegible]		[illegible] I.H.P.
[illegible]		[illegible]	[illegible]		[illegible]
* [illegible]		Hong-Kong	[illegible]		[illegible]

[illegible] the Company.

LIST OF VESSELS ENGINED IN 1911.

W. S. Bailey & Co., Hong-Kong.

Name of Vessel.	Builders.	I.H.P.	Press.
[illegible] Tug	[illegible]	[illegible]	[illegible]
[illegible]		[illegible]	[illegible]
[illegible]		[illegible]	[illegible]
[illegible] Motor Boats		[illegible]	

CHILIAN.

Tolson y Blurton, Santiago.

Name of Vessel.	Built	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
[illegible] Tug	Wood	Valparaiso	[illegible]		[illegible]

INDIAN.

Turner, Morrison & Co. (The Shalimar Works), Ltd., Calcutta.

Name of Vessel.	Built	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
* [illegible]	Mild Steel	Calcutta	[illegible]	40	[illegible]
[illegible]			[illegible]		
[illegible]			[illegible]		
[illegible]			[illegible]		
[illegible]			[illegible]		

All engined by same firm.

STRAITS SETTLEMENTS.

Howarth, Erskine Co., Singapore.

Small Launches only.

Riley, Hargreaves & Co., Ltd., Singapore.

Name of Vessel.	Built	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
[illegible] Steam Tug	Wood	Batavia	[illegible]		[illegible]
[illegible] Steam Launch			[illegible]		[illegible]
[illegible]			[illegible]		[illegible]
[illegible] Steam Launch		New York	[illegible]		[illegible]
[illegible] Steam Launch		[illegible]	[illegible]		[illegible]
[illegible] Motor Lighters		Java	[illegible]		[illegible]
[illegible] Steam Vessel			[illegible]		[illegible]
[illegible] Steam Tug			[illegible]		[illegible]
[illegible] Motor Dredgers		[illegible]	[illegible]		[illegible]

The Tanjong Pagar Dock Board, Singapore.

Name of Vessel.	Built	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
[illegible] Tram Ferry Steamer		Singapore	[illegible]		[illegible]
[illegible] Screw	Wood		[illegible]		[illegible]
[illegible] Screw Steamer	Steel	[illegible]	[illegible]		[illegible]
[illegible] Screw Tug	Wood	Swettenham	[illegible]		[illegible]
[illegible] Screw Yacht	Steel	[illegible]	60		[illegible]
* [illegible] Screw Launch	Wood	Singapore	[illegible]		[illegible]
Lighter	Steel	Singapore	20		[illegible]
* [illegible] Ferry Steamer		[illegible]	[illegible]		[illegible]
[illegible] Lighters		Port Swettenham	[illegible]		[illegible]
[illegible] Lighter	Wood	Singapore	[illegible]		[illegible]
* [illegible]			[illegible]		[illegible]
[illegible]			[illegible]		[illegible]
[illegible]	Wood	Singapore	[illegible]		[illegible]
[illegible]			[illegible]		[illegible]
[illegible]			[illegible]		[illegible]
[illegible]			[illegible]		[illegible]

With [illegible] firm.

LIST OF VESSELS ENGINED IN 1911.

Howarth Erskine, Ltd., Singapore. [illegible]

* [illegible]

SOCIETY ISLANDS.

B. S. Chapman, Papeete, Tahiti.

Name of Vessel.	Built	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
[illegible]					
[illegible]					
[illegible]					

WORK COMPLETED DURING THE YEAR.

ENGLISH.

Sir W. G. Armstrong, Whitworth & Co., Ltd., Newcastle-on-Tyne.—[illegible]

S. P. Austin & Son, Ltd., Sunderland. [illegible]

Blyth Shipbuilding and Dry Docks Co., Ltd., Blyth. [illegible] tiously.

Central Marine Engine Works, West Hartlepool. [illegible]

Sir Raylton Dixon & Co., Ltd., Middlesbrough-on-Tees.—In addition to building [illegible]

R. & W. Hawthorn, Leslie & Co., Ltd., Hebburn-on-Tyne. [illegible]

International Vanadium Co., Ltd. [illegible] Titanium and other special alloys, which are made [illegible] has made no less than 2,000 tons of Vanadium Steel [illegible]

Irvine's Shipbuilding and Dry Dock Co., Ltd., West Hartlepool. [illegible]

Isherwood System of Ship Construction. [illegible]

Isherwood System of Ship Construction (*continued*)

Green Esq., of Sunderland; the Santa Rosalia built by Messrs. W. Hamilton and Co., Ltd., of Port Glasgow for Messrs. Isthmian Steamship Co., Ltd., of London; the Howick Hall built for Messrs. Chas. G. Dunn & Co., of Liverpool; the Egremont Castle built by Messrs. Craig Taylor & Co., of Thornaby-on-Tees for Messrs. James Chambers & Co., of Liverpool. The total number of builders who have already built or are building on the system is thirty-seven and the 140 vessels have been built or are being built by these builders, for sixty-seven firms of ship-owners. Forty-six of the number have been or are being built abroad, the remainder in the United Kingdom. During the course of the year, thirty-seven steamers, aggregating about [illegible] gross register tons, have been launched from the various shipyards. Of the contracts placed during this year, special mention might be made of two ocean-going colliers, 514 ft. by 65 ft. by [illegible] ft. 6 in., ordered by the Navy Department of the United Kingdom Government; five vessels, 414 ft. 2 in. by 52 ft. [illegible] in. by 31 ft. 6 in., ordered by the American Hawaiian Steamship Co., of New York; and five oil tankers ordered by the Deutsche Amerikanische Petroleum Co., of Hamburg. Included in these latter steamers it is interesting to find the 15,000-tonner (which when completed will be the largest oil steamer afloat), about which so much has been written. Vessels have now been built to the highest classification of Lloyd's Register, British Corporation, Bureau Veritas, Germanischer Lloyd, Norske Veritas and American Bureau.

John Readhead & Sons, Ltd., South Shields. In addition to vessels launched, a large amount of repair work has been done in the graving dock department during the year.

The Seamless Steel Boat Co., Ltd., Wakefield, have completed 322 seamless steel lifeboats and 12 seamless steel launches during the year.

Swan, Hunter & Wigham Richardson, Ltd., Wallsend and Walker-on-Tyne. In addition to tonnage launched, the dry docks department carried out a large number of extensive repairs to ships, engines and boilers. During eight years ending 1911, Messrs. Swan, Hunter & Wigham Richardson, Ltd., have launched 168 vessels of 698,092 gross tons, an annual average of 21 vessels of 87,261 gross tons. Maximum (in the year 1906) 25 vessels of 120,621 gross tons.

C. R. Toomer & Co., Ltd., South Shields.—This old-established firm of ship repairers at Tyne Dock has been fully employed during the year with all kinds of repairs, including a number of re-classing Surveys. The Firm's premises are on a commanding site overlooking the Tyne Dock entrance, Northumberland Dock and the River, and have been extended during the year by taking over the Continental Engineering and Ship Repairing Works adjoining, giving them the full frontage at the Dock entrance. The works abut on the Quay Berth of the Dock Basin, where vessels can be placed, ensuring quick despatch in the execution of all kinds of ship and engine repairs and boiler repairs. A special feature of the firm is the dealing with small repairs to the numerous colliers using the dock, which require the utmost despatch to prevent detention. They have also a large connection with Continental ship owners.

SCOTCH.

Bull's Metal and Melloid Co., Ltd.—During the past year the works of this Company at Yoker, on the Clyde, have been extremely well occupied, both in the foundry department and in the bronze rod rolling mill section. The Company have cast a very large number of Bull's Metal Propellers for steamers built on the Clyde and other shipbuilding centres—both of the solid kind and of the "built" or separate blade description; the blades having oval flanges on the principle devised by the Company and largely adopted by engineers and shipowners. The output of propellers, in fact, has been constantly on the increase, and, compared with only two years ago, the output now, or in the immediate future, will be almost doubled. To cope with this enlarged business, the Company have for some time past been making large extensions to their premises. The floor space has been practically doubled; half of the new area being added to the foundry and half to the finishing shop and rolling mill. New cranes, machine tools, and other equipment are being installed, which will enable the Company to handle more than double the previous output. The capacities of the rolling mill are such that finished bars up to 7 ins. diameter can be produced, which is probably as much as can be done anywhere else in Britain.

John Hastie & Co., Greenock.—During 1911 this company have been exceedingly well employed, and have turned out a larger number of steam-steering engines than in any year in the firm's history. In addition to steam-steering gear, they have supplied several sets of the "Hele-Shaw Martineau" electro-hydraulic steering gear, for which patent they are the sole licensees. A large set of this steering gear was fitted in the new Orient Line steamer Orama, which vessel is now on her maiden trip to Australia. It is expected that when shipowners realize the many advantages of this steering gear it will be widely adopted. Amongst other notable vessels fitted with their steam-steering gear during 1911 are the Cunard steamer Laconia, three new vessels for the Union Castle Company, several steamers for the British India Company, the New Zealand Shipping Company, Messrs. Shaw Savill, the Austrian Lloyds, the Austro-Americana, the Nederlandsche Stoomvaart Maatschappij, Lamport & Holt, the Federal Line, T. B. Royden, T. & J. Brocklebank, the Anchor Line, the Adelaide Steamship Company and many others. The firm have a large amount of work on hand for 1912.

Hawthorns & Co., Ltd., Leith.—During the year, the Company has constructed a number of boilers and oil tanks for whaling stations abroad, and have been well employed in carrying out numerous alterations and repairs to shipping. From their Victoria Dockyard, they have turned out several Marine Slipways, constructed on Morton's Patent Principle, and they have at present on hand, slips for Egypt, Australia and the Philippine Islands.

James G. Marr & Co., Leith.—The work of this firm has been principally confined to the repair and overhaul of small vessels and the building of small craft. The principal job done during the year was the conversion of a Trinity Pilot Ketch into an auxiliary motor ketch yacht; the yacht has been made into one of the handiest and most comfortable cruising vessels afloat. Mr. Marr's dry dock has been in fair demand, the number of vessels docked being about up to average.

Thomas Reid & Sons, Paisley.—All their trade has been in making deck machinery, principally for steam and sailing yachts, and they have a fair quantity of that class of work in hand for the coming year.

Sturrock Boiler Furnace Bridges.—The Sturrock Patent Bridge and Engineering Co., of Dundee, report that they have had an exceptionally busy year executing orders for both marine and land boilers from all parts of the world. They are well booked for the year now entered upon, the new marine work being for both new vessels and those in commission. The Company have received a great many unsolicited testimonials from users of the patent bridges—the facility of removing which and replacing them after overhaul, and the improved combustion and consequent economy of fuel they effect being outstanding advantages—and we have been privileged to see a few of these, one of which states:—"The bridges work to our greatest satisfaction, above all expectations. The engineers say they do not know the boilers again. . . . . The firemen say that this invention will reduce their work at least 30 per cent. The coal consumption is reduced several per cent. We now intend to install the bridges in all our steamers."

The United States Metallic Packing Co., Ltd., Soho Works, Bradford, have fitted their metallic packings to the following vessels during the year:—H.M.S.'s Adamant, Alecto, Maidstone, Zealandia, Liberty, Centurion, King George V., Espiegle, Donegal, Venerable, Ajax, Audacious, Queen, Greyhound, Formidable, Queen Mary, King Alfred; s.s. Demosthenes for the Aberdeen White Star Line; s.s.'s Morialta, Corrimal and three new steamers for the Adelaide Steamship Co.; 8 tugs for the Aire & Calder Navigation Co., Ltd.; s.s.'s Media, Circassia and Anchoria for the Anchor Line, Ltd.; s.s. Wearmouth for Anning Bros.; s.s. Rogue Saenz Pena and a new steamer for the Argentine North-Eastern Railway Co.; s.s. Havildar for Asiatic Steam Navigation Co.; s.s. Prinz Hohenlohe for Austrian Lloyds Steam Navigation Co.; s.s. Mandasor for Edward Bates and Sons, Liverpool; s.s. Den of Airlie for Chas. Barrie & Son, Dundee; s.s. Belita for Bergens Mekaniske Werkstad; s.s.'s Syria, Corea, Mopsa and Burma for Bennett Steamship Co.; s.s. Aidan for the Booth Steamship Co.; s.s.'s Bosphorus 67 and 68 for the Bosphorus Steam Navigation Co.; s.s. Koopo for the Brisbane Tug and Steamship Co., Ltd.; s.s. Lady Gwendolin for the British & Irish Steam Packet Co.; s.s.'s Ellora, Egra, Ekma and two new steamers for the British India Steam Navigation Co.; s.s. Sable for G. & J. Burns; s.s. Montoro for Burns, Philp & Co., Ltd.; s.s. Saldanha for the Bucknall Line Steamship Co.; p.s. Lady Ismay for P. & A. Campbell, Ltd.; s.s. Princess Alice for the Canadian Pacific Railway; s.s.'s Grainton, Floristan and Brighton for R. Chapman and Sons; s.s.'s Ballycotton, Warner and Sanda for Clyde Shipping Co., Ltd.; s.s. Clan MacGillivray for Clan Line, Ltd.; s.s.'s Sir Arthur, Hockwald and Crayford for Wm. Cory & Son, Ltd.; s.s. Koolga for Thos. Cowan and Co.; s.s.'s Laconia, Ansonia, Asconia and Caria for the Cunard Steamship Co.; s.s. Ethel Nutten for Davison & Pugh; s.s. Clifton Hall for the Dinsdale Steamship Co.; s.s. Carlow for the County of Dublin Steam Packet Co.; s.s. Kina for the East Asiatic Steamship Co.; s.s.'s Aracataca, Barranca, Miami, Revantazon, Zent and Chirripo for Elders and Fyffes, Ltd.; s.s.'s City of Lincoln, Andalusian, City of Lahore, City of Birmingham and two new steamers for Ellerman Lines, Ltd.; s.s. Chindi for Empreza Nacionalde Navigacio; s.s.'s Cornwood and Dalewood for W. France, Fenwick & Co.; s.s. Corte II. for Fraissinet & Co.; s.t. Spread Eagle for Game Cock Steam Tug Co.; s.s. Trafalgar for J. Glynn & Son; s.s.'s Immingham, Marylebone, Stockport and two new ferry boats for the Great Central Railway; two new steamers for W. R. Grace & Co.; s.s. Alice for Geo. R. Haller, Ltd.; s.s. Harmonic, Hargrove, Hartington, Harcroft and Harpalyce for J. & C. Harrison, Ltd.; s.s. Sculptor and three new steamers for T. and J. Harrison; s.s.'s Whitby Abbey and Rievaulx Abbey for the Hull and Netherlands Steamship Co.; s.s. Alexandra for Irish Lights Commissioners; Cruiser Wu and new cruiser for the Japanese Government; s.s.'s Haulwen and Margaret Jones for W. & T. C. Jones Steamship Co., Ltd.; s.s.'s Rumphius and Van Waarwyck for Koninklijke Paketvaart Maatschappij; s.s.'s Liberty, Berlin and Wharfe for the Lancashire and Yorkshire Railway; s.s.'s Vandyck, Voltaire, Canova, Vanban and Vestris for Lamport & Holt; s.y. Jeannette for J. H. Livesey; s.s. Duchess of Norfolk for London, Brighton & South Coast Railway; s.s.'s Cloughton and Normanby for London & Northern Steamship Co.; p.s. Prince Edward for Loch Lomond Paddle Steamers; s.s.'s Sheila and Cavalier for D. MacBrayne, Ltd.; s.s. Portland for McNeil, Hinde & Co.; s.s.'s Berna and Bruselas for Nicholas Michanovich & Co.; s.s. Lime Branch for the Nautilus Steamship Co.; two new steamers for the National Steam Navigation Co. of Athens; sand dredger Labrus for the Natal Government; s.s. Brooklet for Needham Bros.; p.s.'s Waverley and Talisman for the North British Railway Co.; s.s.'s Karimoen and Karimata for the Nederlandsche Steamboat Maatschappy; s.s. Orama for the Orient Steam Navigation Co.; s.l. Venus for the Port of Portsmouth Steam Launch Co.; s.s. Siamese Prince for the Prince Line, Ltd.; s.s. Rosebank for G. Pyman & Co.; s.s. San Guglielmo for Peirce Bros., Naples; s.s. Saguenay for the Richelieu and Ontario Navigation Co.; s.s. Indrapura for Sir T. B. Royden; s.s.'s Monmouthshire, Denbighshire, Arlanza, Deseado, Demerara and Desna for the Royal Mail Steam Packet Co.; s.s.'s Therese Heyman, Scawby and Heronspool for Ropner & Co.; s.s. Leitrim for Severn Ports Warehousing Co.; s.s. Princess Mary for Southampton Isle of Wight and South of England Mail Steam Packet Co.; s.s.'s Krian, Klang and Kuala for Straits Settlements Steamship Co.; s.s. Andria for Stabilimento Tecnico; s.s.'s Braunton and Exford for Tatem & Co.; s.s. Cumbria for Tedcastle, McCormick & Co.; s.s. Wimborne for Evan Thomas, Radcliffe & Co.; s.s.'s Cordova and Rio Tinto for J. Tully and Son, Sunderland; s.s. Argyllshire for Turnbull, Martin & Co.; s.s. Santiago for Otto Theresen; s.s.'s Gloucester Castle, Guildford Castle and Galway Castle for the Union Castle Line Steamship Co.; s.s. Maunganai for Union Steamship Co., of New Zealand; s.s.'s Corrilla, Sixaola and Tivivis for the United Fruit Steamship Co.; s.s. Clifton for Webster and Barraclough; s.s.'s Borodino, Gourka and Montebello for Thos. Wilson, Sons & Co., Ltd.

IRISH.

Harland & Wolff, Ltd., Belfast. [illegible]

AMERICAN.

Messrs. James Davidson, Mich. [illegible]

Messrs. Lockwood Manufacturing Co., East Boston, [illegible] repairs during the past twelve months.

AUSTRALIAN.

Walker, Ltd., Maryborough, Queensland. [illegible]

WORK ON HAND IN BRITISH YARDS.

ENGLISH.

Isaac J. Abdella & Mitchell, Ltd., Chester. [illegible] Lighters, one 55-ft. Screw Tug.

Isaac J. Abdella & Mitchell, Ltd., Brimscombe, Stroud. [illegible]

Baird Bros., North Shields. [illegible]

Beaching Bros., Ltd., Great Yarmouth.—Five steam drifter

Camper & Nicholson, Ltd., Gosport.

Name of Vessel.	Built of	Owners	G.T. Regis.	G.T. [illegible]	I.H.P.
[illegible]	Composite	British	[illegible]	[illegible]	[illegible]
[illegible] motor yacht	Wood	,,	[illegible]	[illegible]	[illegible]
[illegible]	Wood		6		
m Launches, motor yachts ..	,,	—	3	—	57

[illegible]

John Chambers, Lowestoft. [illegible]

Crabtree & Co., Great Yarmouth. I.H.P.

[illegible]

Crabtree & Co., Great Yarmouth. [illegible]

Edwards & Co., Ltd., Millwall, London. [illegible]

J. C. Fay & Co., Ltd., Southampton. [illegible]

The Goole Shipbuilding and Repairing Co., Ltd., and Associated Firm The Dundee Shipbuilding Co., Ltd.—13 vessels

Wm. Harkess & Sons, Ltd., Middlesbrough. [illegible] Messrs. Elder, Dempster & Co., Ltd.; two cargo vessels for local owners.

Edward Hayes, Stony Stratford. [illegible]

Hepple & Co., Ltd., South Shields. [illegible]

H.M. Dockyard, Chatham. [illegible]

H.M. Dockyard, Pembroke.

[illegible]

Lytham Shipbuilding and Engineering Co., Lytham.

[illegible]

The Northumberland Shipbuilding Co., Ltd., Howdon-on-Tyne. [illegible]

Philip & Son, Ltd., Dartmouth.

[illegible]

G. Rennie & Co., Greenwich.

[illegible]

Joseph Scarr & Sons, Beverley. [illegible]

The Seamless Steel Boat Co., Ltd., Wakefield, [illegible]

Sisson & Co., Ltd., Gloucester

[illegible]

Stow & Sons, Shoreham. [illegible]

Wm. Thomas & Sons, Amlwch. [illegible]

Vauxhall and West, Hydraulic Engineering Co., Ltd., Luton, Beds

[illegible]

W. H. Warren, New Holland, Lincs. [illegible]

J. White, East Cowes. [illegible]

J. Samuel White & Co., Ltd., Cowes, I. of W.

[illegible]

Foreign

[illegible]

Wood, Skinner & Co., Ltd., Newcastle-on-Tyne. [illegible]

W. J. Yarwood, & Sons, Northwich, Cheshire.

[illegible]

ENGINES.

Edward Hayes, Stony Stratford. [illegible]

Messrs. Ross & Duncan [illegible] I.H.P.

SCOTCH.

Dunlop, Bremner & Co., Ltd.—4 Steamers for British owners, with an aggregate [illegible]

Fleming & Ferguson, Ltd., Paisley [illegible]

Hawthorns & Co., Ltd., Leith. [illegible]

London and Glasgow Engineering and Shipbuilding Co., Ltd., Govan. Second-class Cruiser Sydney for Australian Commonwealth.

[illegible]

Peter McGregor & Sons, Kirkintilloch. [illegible]

Mackay Bros., Alloa. [illegible]

Mackie & Thompson, Ltd., Govan.—Five vessels, 6,600 tons.

Murdoch & Murray, Port Glasgow. -Eight [illegible]

A. Robertson & Co., Sandbank, Argyllshire.

[illegible]

Scott & Sons, Bowling nr. Glasgow. [illegible]

John Cran & Co., Leith.

[illegible] Amazon.

J. Weatherhead, Eyemouth.

[illegible]

The Caledon Shipbuilding and Engineering Co., Ltd., Dundee.

[illegible]

Alexander Hall & Co., Ltd., Aberdeen.

[illegible]

Steam Trawler .. .. — — 220 — [illegible]

[illegible]

Alley & MacLellan, Ltd., Polmadie. 22 paddle steamers, 1 single-screw tug, 1 [illegible] 1 sternwheel steamer, 7 barges. Total 800 tons.

A. Munro, Ardrishaig. Two motor boats, 20 tons each.

Fishers, Ltd., Paisley.

‡‡ Not [illegible] yet	P. Meotegot & Sons, Kirkintilloch	140	120
‡‡	Dublin Dockyard Co., Dublin ..	350	130
‡‡	Scott & Sons, Bowling	380	160
	,, ,,	380	160
	,, ,,	140	130
‡‡	John Fullerton & Co., Paisley	400	130

Yarrow & Co., Ltd., Glasgow.

H.M.S. Archer, T.B.D.	British Admiralty.		14,000
H.M.S. Attack, T.B.D.	,,		14,000
H.M.S. Firebrake, T.B.D.	,,		20,000
H.M.S. Latchet, T.B.D.	,,		20,000
H.M.S. Cork, T.B.D.	,,		20,000
Shallow Draught Steamer	Foreign		
,, ,, ,,	,,	150	500
High-speed Turbine Yacht	,,	300	5,000

ENGINES.

Cooper & Greig, Dundee. One set Triple Engines, 1,000 I.H.P., foreign owners.

James Ritchie, Partick. Several sets of tug engines and twin-screw machinery for 100 ft. vessel for Australia.

IRISH.

Dublin Dockyard Co., Dublin.

Name of Vessel.	Built of	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
Grab Dredger, Screw	Steel	—	440	-	—
Passenger, General Cargo and Cattle Steamer, Single Screw	,,	—	250	- -	-

WORK ON HAND IN FOREIGN YARDS.

FRENCH.

Chantiers de l'Atlantique St. Nazaire.

Name of Vessel.	Built of	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
France, packet boat	Steel	French	23,400	—	40,000
† 4 Canonnieres, composite ..	—	Turkish	510	—	1,025
4 Amiral Villaret de Joyeuse, cargo boat	Steel	French	510	—	3,000
4 Amiral Zé lé, cargo boat ..	,,	,,	510	—	3,000

To be engined by same Society.

Chantiers de Normandie, Grand Quevilly, Rouen.

*† Radholeine II., tank steamer for petroleum	—	French	3,900	—	2,100
Dehorter, torpedo boat destroyer for the French Admiralty.					
4 Steel Pontoons	—	Havre	—	—	—

Ed. Corue, Dieppe.

* Rolon	Wood	French	45	—	100

Augustin Normand, Le Havre.

Pluton, mine layer	—	French		570	6,000
t Francis Garnier, destroyer	-	,,		745	13,500
dm Bateau-poste	-	Congo		45	400
dm St. Philippe-St Jeanne de St. Faron, lifeboat ..	-	French	—	0 7	—
m 2 Lifeboats	-	,,	—	total 17	35
4 Pontoons	-	,,	-	150ea	—
4 Lifeboats	-	,,	—	total 14	—

Ste. Anon. Des Chantiers et Ateliers de La Gironde, Bordeaux.

Kangaroo, steamer	—	—	3,530	—	850
t Commandant Riviere, destroyer	—	—	750	—	18,000

Ste. Anon. Des Chantiers et Ateliers de Provence, Port De Bouc.

† Valdivia, Packet Boat ..	—	French	7,500	—	7,800

To be engined by the same Company.

ENGINES.

Ste. Anon. Des Chantiers et Ateliers de la Lute, Le Havre.

Name of Vessel.	Builders.	I.H.P.	Press. kgs.
Dourak-Reis and Hizir-Reis, gunboats ..	Forges et Chantiers de la Mediterranee, Le Havre	850ea	—
Rouen, packet boat ..	,, ,, ,, ,, ..	8,000	—
Le Havre, 2 Lighthips ..	.. ..	120	—
Ville d'Alger, cargo boat ..	.. ..	1,040	—

BELGIAN.

Antwerp Engineering Co., late Chantiers Navals Anversois, Hoboken.

Name of Vessel	Built of	Owners.	G.T. Regis.	G.T. inclu. erect	I.H.P.
1 Steamer, Shelter deck ..			6,600		—
1 Steamer			2,150		-
1 Steamer, Raised Quarter deck			2,000		-

GERMAN.

Actien-Gesellschaft "Neptun," Rostock.

† 4 Cargo-boats	Steel	Hamburg	—	total 11,120
6 Other Vessels	—	—	—	total 9,100

‡‡ Compound Surface Condensing. a Quadruple. dm Diesel Motor. † Triple. *Compound. t Turbine. *† Compound Triple.

Atlas-Werke A. G., Bremen.

Name of Vessel.	Built of	Owners	G.T. Regis.	G.T. inclu. erect.	I.H.P.
* 1 Sternwheel Freight Steamer		German	280		180
† 1 Seagoing Tug					600
* 1 Tug		German			120
* 2 Freight Steamers		Foreign	250		178
1 Lighters		,,	250		

To be engined by same Company.

Blohm & Voss, Hamburg.

Three Battleships-cruisers for the German Navy, 2 Oil-engine-driven boats, 1 Atlantic liner, turbine driven, 1 Twin-screw passenger steamer.

Bremer Vulcan, Vegesack.

† Heidelberg ..		Bremen	1,720		1,650
† Frankfurt ..		,,	1,720		1,650
a Wasgenwald		Hamburg	4,900		3,250
† 554		,,	9,180		1,350
† 555		Bremen	6,740		4,200
† 556		,,	6,740		4,200
a 557		Hamburg	3,740		2,000
a 558		,,	3,740		2,000
† 559		Bremen	8,500		4,200
† 560		,,	8,500		4,200
† 561		,,	5,620		3,000

Flensberger Schiffsbau Gesellschaft.

No. 316..	Steel	Hamburg	1,050		650
,, 317.. ..	,,	,,	1,050		650
,, 318.. ..	,,	,,	3,770	-	1,300
,, 319 and 320	,,	,,	16,000		—
,, 321 and 322	,,	,,	3,600ea		3,200ea
,, 323 and 325	,,	,,	3,900ea		4,000ea
,, 324..	,,	,,	6,900		3,600
,, 326..	,,	,,	7,300		4,500
,, 327..	,,	Bremen	6,700		3,050

J. G. Hitzler, Lauenburg (Elbe).

17 Motor Boats	Steel		-	—	-
4 Lighters	,,		-	-	—
1 Motor Tug	,,	—			-

R. Holtz, Harburg-Elbe and Hamburg.

Steamboat	Steel	Foreign	198	-	751
Motor Boat	,,	,,	23	-	74
Lighter	,,	,,	36		—
Motor Boat	,,	German	8	—	30

J. W. Klawitter, Danzig.

† 3 Survey Boats	Steel	German	207		130
* 2 Passenger Steamers ..	,,	,,	208	-	130
6 Mud Barges	—	,,	2,308	-	—

Engines to be by same firm.

Werft D. W. Kremer Sohn, Elmshorn.

1 Schooner	Steel	home and abroad	68	-	..
1 Motor Boat, Single Screw	,,	,,	14	-	-
2 Lighters	,,	,,	95	-	
1 Punt	Wood	,,	4	—	
1 Barge	Comp.	,,	20		—

Fried Krupp, A-G., Germaniawerft, Kiel.

t Catamarca and Jujuy, Torpedo Boats	—	Argentine	—	990ea	18,000ea
dm Mentor, Motor Boat ..	-	Germany	-	75	600
G7-12 Torpedo Boats	—	,,	-	—	—
dm U23-26, Submarines ..	-	,,	—	—	--
Prinzregent Luitpold, Battleship	—	,,	—	—	-
Ersatz Sceadler, Scout	—	,,	—	—	
dm Atropo, Submarine ..	—	Austria	--	300	-
dm 3 Submarines	—	Germany		—	—
dm S 186-7, 2 Tankships	-	,,	5,800ea		2,300ea
dm S188, 1 Tankship	—	,,	15,000		3,500

C. Luhring, Brake, Oldenburg.

No. 118, Schooner	Steel	Rostock	70	- -	—
No. 119, Barque..	,,	Hamburg	40	-	—
om No. 120, 3-mast Schooner	,,	Geestemünde	270	—	80
m No. 121, Steamer	,,	Oldenburg	370	-	—

J. L. Meyer, Papenburg.—1 lightship, 3 tugs, 1 passenger steamer, total 575 reg. tons; 1,010 I.H.P.

North German Lloyd, Bremerhaven.

† Nos. 555 and 556, Cargo Steamers	Steel	Bremen	—	—	4,000
† Nos. 559 and 560, do. ..	,,	,,	—	—	4,000
† Nos. 328 and 329 do. ..	,,	,,	—	—	4,000

Reiherstieg Schiffswerft und Maschinenfabrik, Hamburg.

† Bahia Blanca, T.S. Cargo .	—	Hamburg	—	9,500ab	3500
a S.S. Pass. and Cargo	—	,,	—	6,060ab	3,700

Rickmers Rusmuhlen, Rhederei & Schiffsbau A.-G., Bremerhaven.

† Nos 161 and 163, Tramp Steamers	—	Hamburg	5,000ea	-	2,500ea
No. 164, Tramp Steamer ..	—	Lübeck	4,000		2,000

Sachsenberg Bros., Ltd., Rosslau.

* No. 677, Steamer		Düsseldorf	565	-	1,250
* No. 680, Steamer		Köln	585	-	1,250
Nos. 681-684, 4 Barges ..		Wilhelmshaven	281	- -	—
Nos. 685 & 686, 2 Barges ..		,,	261		—
* 687, Steamer		Hamburg	300		520
Nos. 688-690, 3 Barges ..		Wilhelmshaven	130		—
† No. 691, Steamer		,,	960		600

F. Schichau, Elbing and Danzig.

Vessels under construction—Gross registered tons, 63,700; I.H.P., 245,400.

* Compound †Triple. a Quadruple. t Turbine. dm Diesel Motor. om Oil Motor. m Motor.

Gustav Fechter Schiffswertt, Konigsberg.

Name of Vessel	Built of	Owners	G.T. Regis.	G.T. incln. erect	I.H.P.
No. 151	Steel	Konigsberg		100	
,, 1[illegible]	,,	,,		[illegible]	
,, 1[illegible]7	,,	,,		60	
,, 160.	,,	Libau		[illegible]	

Schiffwerft von Henry Kock A.-G., Lubeck.

† No. 211.	Steel	Oldenburg		2,24[illegible]	1,000
† ,, 212.	,,	Lubeck		[illegible]	[illegible]
† ,, 213	,,	,,		1,500	1,7[illegible]0
† ,, 214		Hamburg		1,2[illegible]0	8[illegible]0
† ,, 21[illegible]	,,	,,		1,6[illegible]0	8[illegible]0

Schiffswertte und Maschinenfabrik (Vorm. Janssen & Schmillinsky), A. G., Hamburg.

* Earphay XI., Tug	Steel	German		74	320
* No. 2[illegible], Tug				178	600
* No. 2[illegible], Tug				28	100
* No. 26, Tug				170	450

Stettiner Maschinenbau A. G. Vulcan, Hamburg.

Friedrich der Gross, Liner	Steel	Wilhelmshaven		14,500	
x Breslau, Cruiser		Kiel		3,100	
Floating Dock		Hamburg		2,[illegible]	
f Imperator, Freight and Passenger Steamer		,,		2,000	
x S 217–22, 6 Torpedo Boats		Wilhelmshaven		3,240	
x S 324, Freight and Passenger Steamer		Stettin		1,750	1,100
S 325, Liner		Wilhelmshaven		16,000	
x S 326, Icebreaker		Hamburg		170	640
x S 327, Icebreaker		,,		170	640
x S 328 Freight and Passenger Steamer		Bremerhaven		8,000	4,300
x S 329, ,,		,,		8,090	4,300
x*S [illegible], Dredger		Stettin		24	120
x*S [illegible], Dredger		,,		25	220

Those marked with a x were built at Stettin, the others at Hamburg.

Stettiner Oderwerke, Stettin.

† No. 629, Dredger		Stettin	193		250
* ,, 630 and 631, Suction Dredgers		Breslau	230ea		600e
† ,, 632, Freight and Pass. Steamer		Stettin	1,440		1,100
* ,, 633, Suction Dredger		Wilhelmshaven	960		800
* ,, 634, Cargo Vessel		Stettin	290		300
† ,, 635, Cargo Vessel		Hamburg	1,837		1,000
† ,, 636, Cargo Vessel		,,	1,860		750

Joh. C. Teckienborg A.-G., Geestemunde.

† S.S. 245	Steel	Hamburg	9,000		3,750
† S.S. 246	,,	,,	9,000		3,750
† S.S. 247	,,	,,	7,000		3,600
† S.S. 248	,,	,,	7,000		3,600
a S.S. 249	,,	Bremen	6,[illegible]		3,000
dm S.S. 250, Motorship	,,	,,	2,000		1,800
† S.S. 251	,,	Hamburg	7,600		3,600
a S.S. 252	,,	Bremen	8,[illegible]		3,750
† S.S. 253	,,	Hamburg	9,000		3,750
† S.S. 254	,,	,,	9,000		3,750
† S.S. 2[illegible]	,,	Bremen	6,700		3,000

To be engined by same firm.

J. H. N. Wichhorst, Hamburg.

No. 247 and 248, Lighters	Steel	Hamburg	30ea		—
* No. 249, Ferry Boat	,,	,,	120		250

Engines by J. H. N. Wichhorst.

Gebr. Wiemann, Brandenburg a. H.

7 Tugs totalling 1,600 I.H.P.

Caesar Wollheim, Breslau.

1 Vessel				—	2,[illegible]80

To be engined by same firm.

AUSTRIAN.

Cantiere Navale Triestino, Monfalcone.

Name of Vessel.	Built of	Owners	G.T. Regis.	G.T. incln. erect.	I.H.P.
Yard No. 26, Steam Tug		Austrian	[illegible]		120
,, [illegible], Pass. Vessel	Steel	,,	180		[illegible]
,, 24, Cargo Steamer	,,	,,	6,[illegible]		2,[illegible]
,, 25 ,,	,,	,,	6,7[illegible]		[illegible]
,, 31 & 32 ,,	,,	,,	[illegible]ea		2,000ea
,, 34 ,,	,,	,,	6,7[illegible]		[illegible]
,, 2[illegible], Armoured Cruiser	,,		4,000		22,000

Marco M. Martinolics, Lussinpiccolo.

* No. 176, & 194 Passenger	Steel	Fiume		[illegible]	600

Stabilimento Tecnico, Triestino.

Viribus Unitis, Battleship			[illegible]		2,[illegible]
V, Battleship			[illegible]		2,[illegible]
VI, Battleship			[illegible]		2,[illegible]
Destroyer			[illegible]		6,[illegible]
Twin Screw Motor Tugboat			[illegible]		[illegible]
Paddle Steamers			[illegible]		1,000
Floating Crane			[illegible]		—
Motor Boat			[illegible]		
Motor Tugboat			[illegible]		[illegible]
Stellaballas Motorboat			[illegible]		[illegible]
5 Lighters			[illegible]		—

† Triple. * Compound. f Turbine. a Quadruple.
dm Diesel Motor.

HUNGARIAN.

Der Altofner Schiffswerfte der Donau Dampfschiffahrts Gesells., Budapest.

Name of Vessel.	Built of	Owners	G.T. Regis.	G.T. incln. erect.	I.H.P.
* 2 Passenger Steamers side wheel	Steel		[illegible]		
* Steam Tugs, side wheel			[illegible]		
1 Police Boat			[illegible]		
12 Barges					
Screw Steamer					

THE NETHERLANDS.

The Arnhem Co., Arnhem.

Four steel tugs, 2 gravel dredgers, 1 steam ferry, 1 market vessel Royal Dutch Navy. Total 1,1[illegible] tons displacement and 12 sets of engines totalling 1,7[illegible]0 I.H.P.

Naaml Venn Scheepsbouwerf Baanhoek, Sliedrecht.

Name of Vessel	Built of	Owner	G.T. Regis.	G.T. incln. erect.	I.H.P.
1 Hopper Barge		Sliedrecht		—	
3 Hopper Barges		Scerdaava			

H. H. Bodewes, Millingen.

Rhine boat	Steel	Rheinduirkheim		1,[illegible]00	
		Homberg-Rhein		1,[illegible]00	
,, ,, ,,		Cochem-Mosel		1,2[illegible]	

Wed. C. Boele & Son, Holland. 2 Crane pontoons, Tugs, 1 Lighter.

Bonn & Mees, Rotterdam, Holland.

† Hopper Dredger	Steel	B. Ayres	3,[illegible]	—	1,200
Training Ship	,,	Rotterdam	4[illegible]	—	
* Tugboat I.	,,	,,	[illegible]		[illegible]
* ,, II			60		60
m Motorboat			80		[illegible]
† Steam Trawler	,,	France	200		220

Gebr. Boot.

7 Barges			3,670	[illegible]	
3 Motor Barges			250	[illegible]	—
2 Sailing Luggers, 1 Ironcrans					
Herrings			—	[illegible]	—

D. Goedkoop, Jr., Amsterdam.

3 Launches	Wood, Home & For.				
4 Launches	Steel	,,	,,		
1 Pontoon Boat	,,	,,			
3 Cargo Boats	,,	,,			
2 Tenders	,,	,,			

Various other craft to be fitted with Kromhout oil engines.

De Groot & Looyen, Gorinchem. 4 boats.

Maatschappij voor Scheeps-en Werktingbouw Fijenoord, Rotterdam.

† Van Overstraten, Passenger Steamer	Steel	Dutch	2,200	—	[illegible]
† Krakatau, Cargoboat	,,	,,	6,[illegible]	—	4,[illegible]
† Schenten and De Weert, Passenger Steamers	,,	,,	1,77[illegible]	—	1,[illegible]
† 2 Torpedo Destroyers	,,	,,	dis. 42[illegible]		8,[illegible]
a Koningen Emma, T.S. Pass. Steamer	,,		7,300	—	6,000
† Trent, T.S. Pass. Steamer	,,	—	3,000	—	3,200

Chawn, Fortuna, Tauna, total I.H.P. 3,500, engines and boilers only.

K. J. Koopman, Dordrecht.

‡‡ No. 68, Tug	—		—	—	[illegible]
† No. 69, Sea-going Tug	—		—	—	[illegible]

To be engined by same firm.

Gebr. Pot, Ridderkirk.

2 T.S. Pass. Boats	—	Amazon River	1,000ea		
4 Crane Pontoons	—	Bombay	177ea		
6 Lighters	—	Liege	[illegible]ea		
* 2 T.S. Cargo Steamers	—	Rotterdam	700ea		—
* T.S. Pass. Boat	—		1,[illegible]		—

N. N. Werf vh Rykee & Co., Rotterdam.

† Charon, Cargo Steamer	Steel	Amsterdam	—	[illegible]	1,700
† Fauna, Cargo Steamer	,,	,,	—	1,500	1,000
† Fortuna, Cargo Steamer	,,	,,	—	[illegible]	[illegible]

The Royal "Schelde" Shipbuilding & Engineering Co., Flushing.

Name of Vessel	Built of	Owners	G.T. Regis.	G.T. incln. erect.	I.H.P.
2 Submarines, 2 Destroyers, 1 Cargo Boat			[illegible]		

Jan. Smit Czn, Alblasserdam.

† Randwijk, Cargo Steamer		Rotterdam	[illegible]		[illegible]
m No. 464, Motor boat		Alblasserdam		—	

J. & K. Smits, Scheepswerven, Kinderdijk.

* No. 644, Coal Elevator		Dordrecht			[illegible]
* ,, 645, Tugboat					
† ,, 646 & 647, Steam Hopper	—	V[illegible]	[illegible]		[illegible]

J. U. Smit Werf de Noord, Alblasserdam.

Yacht			—		
Lighter	—	—	—		
Meerland, Wirtland, Schiatland, and Amsterland Lighters	Steel	Rotterdam	[illegible]		—

* Compound. † Triple. m Motor. a Quadruple.
‡‡ Unspecified Surface Condensing.

A. F. Smulders, Schiedam, nr. Rotterdam.

Name of Vessel	Built at	Owners	G.T. Regis.	I.H.P.
[illegible] Suction Dredger..	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible] Floating Crane..	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

W. F. Stoel & Zoon, Alkmaar.

Name of Vessel	Built at	Owners	G.T. Regis.	I.H.P.
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

A. Vuijk & Zonen, Capelle, nr. Rotterdam.

Name of Vessel	Built at	Owners	G.T. Regis.	I.H.P.
S.S. [illegible]	[illegible]	[illegible]	[illegible]	[illegible]
S.S. [illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Gebrs. van de Wetering, Waaldijk, Rotterdam.

Name of Vessel	Built at	Owners	G.T. Regis.	I.H.P.
S.S. [illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	Batavier	[illegible]	[illegible]	[illegible]

ENGINES.

Alblasserdamsche Machinefabrik, Alblasserdam.

Name of Vessel	Built at	I.H.P.	Pressure
[illegible] Passenger			
[illegible]	Jonker & Stam	1,200	18
[illegible]	[illegible]	1,200	18
[illegible]	Jonker & Stam	[illegible]	18
[illegible]	Jonker & Stam	[illegible]	18
2 Tug Boats	[illegible]	[illegible]	180
Tug Boat			180
Tug Boat	[illegible]	[illegible]	18
Tug Boat	[illegible]	[illegible]	180

Netherlands Engineering Co., Amsterdam.

Name of Vessel	Built at	I.H.P.
[illegible] Bunkboat	Nederlandsche Scheepsbouw Maatschappij	1,100 B.H.P.
[illegible] Motorboat	" "	2,200 B.H.P.
[illegible] for Nederlandsche Mij. Steamer		[illegible]
Passenger Steamer		[illegible]
† Van Nek, "	" "	1,500

The Royal "Schelde" Shipbuilding & Engineering Co., Flushing.

Engines total 24,[illegible] I.H.P.

NORWEGIAN.

Akers Mek Verksted, Kristiania.

Name of Vessel	Built at	Owners	G.T. Regis.	G.T. mchd.	I.H.P.
Yard No. [illegible]	Steam	Steel	Norway	18[illegible]	[illegible]
[illegible] 25	"	"	"	176	700
[illegible]	"			17[illegible]	[illegible]
[illegible]				[illegible]	500
[illegible]				145	[illegible]
[illegible]	"			7[illegible]	600
[illegible]		"	"	[illegible]	850
[illegible]				[illegible]	[illegible]
[illegible]				[illegible]	[illegible]
[illegible]	"			142	[illegible]
[illegible]				[illegible]	600
[illegible] 23 & 24				[illegible]	[illegible]
Large No. [illegible] & 27					[illegible]

To be engined by same Company.

A. S. Bergens Mek. Værksted, Bergen.

Name of Vessel	Built at	Owners	G.T. Regis.	G.T. mchd.	I.H.P.
4 Vessels, Cargo	Steel		[illegible]		[illegible]
3 Vessels, Whalers			[illegible]		[illegible]

To be engined by same firm.

Christiansand Mekaniska Værksted, Christiansand.

Name of Vessel	Built at	Owners	G.T. Regis.	G.T. mchd.	I.H.P.
No. 141 Passenger Steamer	Steel	Bergene	[illegible]	[illegible]	[illegible]
No. 142 Whaler		Sandefjord	[illegible]	[illegible]	[illegible]
No. 143 Passenger Steamer		Bergen	[illegible]	[illegible]	[illegible]

Framnæs Mekaniske Værksted, Sandefjord.

Name of Vessel	Built at	Owners	G.T. Regis.	G.T. mchd.	I.H.P.
Palatz Pol.t Yacht	Wood	Sandefjord	[illegible]		[illegible]
Yard No. [illegible] and [illegible] Whalers			[illegible]		[illegible]

Laxevaags Maskin & Jernskibsbyggeri, Bergen, Norway.

Name of Vessel	Built at	Owners	G.T. Regis.	G.T. mchd.	I.H.P.
S.S. No. [illegible] Dubbelbeck	Steel	Bergen	[illegible]	[illegible]	[illegible]
S.S. No. [illegible] Dubbelbeck			[illegible]	[illegible]	680
S.S. No. [illegible] Dubbelbeck			[illegible]	[illegible]	[illegible]

Nylands Værksted, Christiania.

Name of Vessel	Built at	Owners	G.T. Regis.	G.T. mchd.	I.H.P.
No. [illegible] Cargo Steamer	Steel	Norway	[illegible]		[illegible]
[illegible]			[illegible]		[illegible]
[illegible] Steamer			[illegible]		[illegible]
[illegible]			[illegible]		[illegible]
[illegible] Whalers			[illegible]		[illegible]
[illegible] Steamer			[illegible]		[illegible]
[illegible]			[illegible]		[illegible]

To be engined by same firm.

Porsgrunds Mek. Værkstad, Porsgrund.

Name of Vessel	Built at	Owners	G.T. Regis.	G.T. mchd.	I.H.P.
[illegible]	Norwegian				[illegible]
[illegible]			[illegible]		[illegible]

[illegible]

SWEDISH.

Oskarshamns Mekaniska Verkstads Och Skeppsdocka Aktiebolag, Oskarshamn.

Name of Vessel	Built at	Owners	G.T. Regis.	G.T. mchd.	I.H.P.
No. [illegible] Passenger Steamer	Steel	Sweden	[illegible]		[illegible]
No. [illegible] Cargo Steamer					
[illegible]		Norway	[illegible]		[illegible]
No. [illegible] Cargo Steamer		Sweden	[illegible]		[illegible]

To be engined by same Company.

DANISH.

Burmeister & Wain, Copenhagen.

Name of Vessel	Built at	Owners	G.T. Regis.	G.T. mchd.	I.H.P.
Motor Ship	Copenhagen	[illegible]	[illegible]		[illegible]
Polaris Passenger Steamer		Peter	[illegible]		[illegible]
S.S. No. [illegible] Cargo and Passenger Steamer	Copenhagen	[illegible]	[illegible]		[illegible]

To be engined by same firm.

Helsingors Jernskibs-og Maskinbyggeri, Elsinore.

Name of Vessel	Built at	Owners	G.T. Regis.	G.T. mchd.	I.H.P.
No. [illegible]	Steel	Copenhagen	[illegible]		[illegible]
No. [illegible]	Steel	Finland			[illegible]

To be engined by same Company.

Bergsunds Mek. Werkstads Aktiebolag, Stockholm.

Name of Vessel	Built at	Owners	G.T. Regis.	G.T. mchd.	I.H.P.
No. [illegible] Barge	Steel	Stockholm	[illegible]		[illegible]
No. [illegible] Passenger Boat		Swed. Navy	[illegible]		[illegible]
No. [illegible] Training Ship		Stockholm	[illegible]	[illegible]	
No. [illegible] Passenger Steamer		Werby	[illegible]	[illegible]	[illegible]

RUSSIAN.

Ste. Anon. Chantiers Navals Ateliers et Founderies de Nicolaiev, Nicolaiev.

Name of Vessel	Built at	Owners	G.T. Regis.	G.T. mchd.	I.H.P.
No. [illegible] Submarine of which particulars cannot be given.					
No. [illegible] Bucket Dredger	Steel	Russia	[illegible]		[illegible]
No. [illegible] Suction Dredger			[illegible]		[illegible]
No. [illegible] Paddle Steamer			[illegible]		[illegible]
No. [illegible] Battleship			[illegible]		[illegible]
No. [illegible] and [illegible] Destroyers			[illegible]		[illegible]
No. [illegible] Hopper Barge	Steel		[illegible]		[illegible]

To be engined by same Company.

FINNISH.

Maskinfabriken Alta, Helsingfors. [illegible] I.H.P.

A. B. Sandrikens, Skeppsdocha-och-Mechaniska Verkstad, Helsingfors.

Vessels			
[illegible]		[illegible]	[illegible]

Three to be engined by the Company. Compound engines.

ITALIAN.

Giovanni Poli, Chioggia.

12 Barges, Steel, for the Royal Navy, totally 480 tons.
2 Floating Cranes, for lifting submarine vessels, 50 tons.

Officine & Cantiere Napoletani C. & T. Pattison, Naples.

12 Torpedo Boats, similar to those launched in 1911 for Italian Navy.
6 Destroyers of about [illegible] tons for Italian Navy.

Soc. Anon. Veneziana Industrie Navali e Meccaniche, Venice.

Yard Nos. 22 and 23, Towing Ships.
Yard No. [illegible], Light service.

Societa Esercizio Bacini, Genoa.

Two steamers of 1,000 tons each, engined by same firm.
Two schooners 208 ft. long.

SPANISH.

Compania Euskalduna de Construccion y Reparacion de Buques, Bilbao.

Name of Vessel	Built at	Owners	G.T. Regis.	G.T. mchd.	I.H.P.
Basurto and Carrasquedo Single deck	Steel	Bilbao		[illegible]	
No. [illegible] Single deck				[illegible]	

AMERICAN.

The American Car & Foundry Co., Wilmington, Del.

Name of Vessel	Built at	Owners	G.T. Regis.	G.T. mchd.	I.H.P.
4 Fishing Steamers				[illegible]	
[illegible] Dumping Scows				[illegible]	

The Bath Iron Works, Bath, Maine.

Name of Vessel	Built at	Owners	G.T. Regis.	G.T. mchd.	I.H.P.
Jouett and Jenkins, Torpedo Boat Destroyers	Steel	U.S. Gov't	[illegible]		[illegible]
Cassin and Cummings do.			[illegible]		[illegible]

Engines by the Bath Iron Works.

F. S. Bowker & Son, Phippsburg, Me., are building [illegible] gross tons [illegible] to be launched in the spring.

Cobb, Butler & Co., Rockland, Me.

Two steamers of a similar type to those launched [illegible]

W. Cramp & Sons, Beach and Ball, Philadelphia.

Name of Vessel	Built at	Owners	G.T. Regis.	G.T. mchd.	I.H.P.
Lehigh Valley R.R. Co. Car Floats		New York	[illegible]		
Lehigh Valley R.R. Co. Car Float			[illegible]		
[illegible] Submarines		U.S. Navy			[illegible] B.H.P.
2 Triple Destroyers Nos. [illegible]					
[illegible]			[illegible]		[illegible]

The Detroit Shipbuilding Co., Detroit, Michigan.

One screw wheel bulk cargo conveyor steamer; estimated gross tonnage, 5,000; estimated H.P., 1,800. Hull, No. 189, Bulk Cargo Steamer, gross [illegible] I.H.P. [illegible] Pressure [illegible] Type of engine, triple-expansion.

[illegible] Compound. [illegible] Metal. [illegible] Triple-expansion.

J. H. Dialogue & Son, Camden Co., N.J.

The Dubuque Boat and Boiler Co., Iowa.

The Fore River Shipbuilding Co., Mass.

The Gas Power Engine Co. and C. H. Seabury Co., New York.

Harlan & Hollingworth Corporation, Wilmington, Del.

T. S. Marvel Shipbuilding Co., Newburgh.

Maryland Steel Co., Sparrows Point, M.D.

The Moran Co., Seattle, Wash.

The New York Shipbuilding Co., Camden, New Jersey.

Morena Battleship fitting

The Newport News Shipbuilding & Dry Dock Co., Newport News, Va.

D. M. Swain, Stillwater, Minnesota.

Union Iron Works Co., San Francisco, Cal.

U.S. Navy Yard, Mare Island, California.

Waters-Colver Co., 45, Broadway, New York

ENGINES.

The Great Lakes Engineering Works, Detroit, Mich.

CANADIAN.

Joseph McGill, Shelbourne, N.S.

AUSTRALIAN.

Morrison & Sinclair, Balmain, Sydney, N.S. Wales.

Morts Dock and Engineering Co., Ltd., Balmain, Sydney.

ENGINES.

Morts Dock and Engineering Co., Ltd., Balmain, Sydney

JAPANESE.

The Fujinagato Yard, Osaka.

The Kobe Mitsubishi Dockyard and Engineering Works, Kobe.

Tug Boat

The Mitsu Bishi Dockyard and Engine Works, Nagasaki.

Steamer

The Oaki Shipyard, Tokyo.

Ono Tekko Zosengo Nakaguchi-machi Nishiku, Osaka.

ENGINES.

The Ishikawajima Shipbuilding and Engineering Co., Ltd., Tokyo.

CHINESE.

The New Engineering and Shipbuilding Works, Ltd., Shanghai.

HONG-KONG.

The Taikoo Dockyard and Engineering Co. (of Hong-Kong), Ltd.

INDIA.

Turner, Morrison & Co. (The Shalimar Works, Ltd.), Calcutta.

STRAITS SETTLEMENTS.

Riley, Hargreaves & Co., Ltd., Singapore.

The Tanjong Pagar Dock Board, Singapore.

ENGINES.

The Tanjong Pagar Dock Board, Singapore.

Boat

SOCIETY ISLANDS.

B. S. Chapman, Papeete, Tahiti.

Industrial and Trade Notes.

THE CLYDE AND SCOTLAND.

(*From our Own Correspondent*)

Work Accomplished and in Prospect.—At the close of another year the record of events and progress for the month is naturally eclipsed in interest by the tale of work accomplished during the whole year. Information as to the output of Clyde shipbuilding and engineering firms, as well as that of the firms in other British centres and of firms in all parts of the world, will be found in the form of tabulated statistics on other pages. In view of this the notes dealing with December need not be so detailed as in the customary monthly reports, and the space at disposal may more fittingly be devoted to work on hand and in prospect than to work accomplished. It is necessary, however, that something should here be said however brief as regards the measure of the year's industry viewed from the standpoint of tonnage output. Writing within measurable hail of the completion of 1911, but in advance of the latest statistics elsewhere to be found in these pages, it is possible to forecast what the volume of work has been. Speaking of the Clyde district apart from the other districts in Scotland—and they unfortunately do not constitute on this occasion a factor of much consequence either way—it is almost certain that it will have to its credit a larger tonnage output than in any previous year. The total output up to the end of November has been 245 vessels of 535,800 tons, and this is larger than the output for the eleven months of last year by nearly 170,000 tons. The figure, however, is short of the record figure for the whole twelve months—*viz.*, the output for 1907—by about 84,000 tons, but the full and accurate annual returns always include a variety of shipping craft "shipped abroad in pieces," or not previously reported, and the figures for the full twelve months of 1911 are, as has been indicated, almost certain to break the records of 1906 and 1907, and to run to between 620,000 and 630,000 tons.

New Shipbuilding Orders.—Since last month's notes were penned a large number of fresh contracts for new shipping have been booked by Clyde shipbuilders, and taken in conjunction with the volume of work still in hand and recently placed, they guarantee for the first half of 1912, at least, exceedingly busy times for all classes of shipyard and engine shop artisans. Never before, in fact, has the outlook been brighter from the point of view of both employer and worker. For the latter, indeed, the prospect is of the rosiest description, and should, unfortunately, the present dearth in the supply of skilled labour continue or become accentuated wages unrest and worse may soon eventuate. In the following paragraphs the fresh contracts booked are given mostly in the order of their importance.

Messrs. Caird & Co., Greenock (who have at present a vessel of similar size and type on the stocks for the same Company), have secured the order for two twin-screw steamers for the Peninsular and Oriental Company. They are to be of 11,000 tons and similar in design and arrangement to the *Ballarat* just completed.

Messrs. Alexander Stephen & Sons, Linthouse, have received from the Royal Holland Lloyd Co., of Amsterdam, an order for two mail and passenger steamers for their South American service similar to the *Hollandia* and *Zeelandia*, built by them two years ago. The new vessels are to be 560 ft. long, 66 ft. beam, 49 ft. deep and of 14,000 tons, having engines of about 11,000 i.h.p., to drive the vessels at 17 knots.

Messrs. A. & J. Inglis, Pointhouse, have secured from the South Indian Railway Company the order to build and engine three turbine steamers of about 250 ft. in length, of good speed and good passenger accommodation on a comparatively shallow draught, for service between the Railway Company's termini and the port of Colombo, Ceylon, there to connect with the large vessels of the East and West mail lines. The turbine engines will be of the Parsons type, in the manufacture of which Messrs. Inglis have already proved themselves masters. The Pointhouse firm have also recently booked an order from the Belfast and County Down Railway Company for a 16-knot steamer of 220 ft. length and 26 ft. beam.

Messrs. D. & W. Henderson, Partick, are to build for the Leyland Line, Liverpool, a steamer of 8,000 tons deadweight, and for the same Company a steamer of similar capacity is to be constructed by Messrs. The Scott Shipbuilding and Engineering Co., Greenock.

Messrs. William Hamilton & Co., Port Glasgow, have secured an order from the Royal West Indian Mail Co., Amsterdam, for two large passenger and cargo steamers which will be fitted with engines by Messrs. David Rowan and Co., Glasgow, to give the vessels a speed of 13 knots.

Messrs. Dunlop, Bremner & Co., Port Glasgow, have booked an order from the Rea Shipping Co., Liverpool, for a steamer of 3,000 tons deadweight, also one from Messrs. Thos. Wilson, Sons & Co., of Hull, for a steamer of 3,800 tons deadweight for their Baltic trade.

Messrs. A. Rodger & Co., Port Glasgow, have received from Messrs. Hugh Hogarth & Co., Glasgow, (for whom they have just launched a steamer 410 ft. in length), an order to build a steamer of good size which will be engined by the builders from their engine works in Helen Street, Govan.

Messrs. Napier & Miller, Old Kilpatrick, have also booked a similar vessel for Messrs. Hogarth & Co., as well as a steamer of about 9,000 tons carrying capacity from Messrs. Raeburn & Verel, Glasgow.

Messrs. Wm. Denny & Brothers, Dumbarton, who have recently booked an order for a steamer from the Union Steamship Co., of New Zealand, are also amongst the successful tenderers for the newest lot of British torpedo-boat destroyers. They have secured the order for one of the vessels, as have also the Fairfield Company, Govan. The other five vessels have been secured by firms in England. These are the last of the destroyers provided for in the Estimates for the current year; of the whole twenty vessels the Clyde has secured eight, the Tyne seven, and the Solent five. Twelve are of what are sometimes called the "Standard" type, seven are of a so-called "special" type, and one is an experimental vessel in which Diesel oil engines will take the place of cruising turbines.

Completion of H.M.S. "Yarmouth."—The second-class protected cruiser *Yarmouth*, built by the London and Glasgow Shipbuilding and Engineering Co., Govan, for the British Government, has undergone all her official trials, passing through all the tests—speed, astern, turning, steering and others—with the greatest success, and exceeding the contract stipulations by a very satisfactory margin. The designed shaft horse-power of the class of which the *Yarmouth* is one was 22,000. On the trials the vessel exceeded this figure by about 2,000 and attained a mean speed of 26 knots—one knot over the speed for which the class was designed. The maximum speed attained was 27 knots—two knots over the contract. During the week's period of test on the Firth of Clyde the vessel also passed through a most successful 32-hours' evaporation test. She is now in her builders' fitting-out basin at Govan and requires only to be opened out, dry docked and otherwise made ready for delivery and commission. The *Yarmouth*, it should be stated, has turbines of the Brown-Curtis type supplied by Messrs. John Brown and Co., Ltd., Clydebank.

THE TEES AND HARTLEPOOLS.

(*From our Own Correspondent.*)

Middlesbrough.

Messrs. Sir Raylton Dixon & Co., Cleveland Dockyard, continue to be very busy. They have recently booked an order for a large cargo steamer about 350 ft. long for Messrs. Howard Smith & Co., Melbourne.

Messrs. W. Harkess & Co., Ltd., are very busy in both the new and repair departments, but nothing new is reported during the month.

Messrs. Smith's Dry Dock Co. have many orders in hand, and work is being commenced on the additions to be made to the works.

Messrs. Richardsons, Westgarth & Co., Ltd., are reported as having plenty of work, and are likely to secure the order for the machinery for the boat to be built by Messrs. Sir R. Dixon & Co., for Messrs. Howard Smith & Co., mentioned above. There is also a report of the introduction of a new department for the manufacture of malleable castings. They

have a fair amount of land work on hand. Recently they cast a bed plate of about [illegible] tons, being a record for them.

Stockton and Thornaby.

Messrs. Craig, Taylor & Co. continue to be very busy, having a large amount of work on hand which will keep them engaged for a long way into next year.

Messrs. R. Ropner & Son. Nothing new is reported during the month but a fair amount of work is on hand and there are better prospects for next year.

Messrs. Blair & Co. are reported as having secured several orders for machinery for vessels building locally, also on the Wear, all departments being exceptionally busy.

Messrs. Richardson, Duck & Co. are reported as having booked an order for a cargo steamer; they continue to be very busy, although prices continue very firm, on account of the rise in the price of material and labour.

West Hartlepool.

Messrs. W. Gray & Co., Ltd., continue to be as busy as ever. Amongst the new orders is one for Messrs. J. F. Wilson & Co. for a cargo steamer which with the work in hand will keep them busy through the best part of next year.

Messrs. Irvine's Shipbuilding and Dry Dock Co., having recently launched the s.s. *Cadmus* for Glasgow owners, are busily engaged in putting down a sister ship for early delivery. Work continues brisk in the dry dock department.

The Central Marine Engine Works of Messrs W. Gray & Co. are about full up with work. They also will make the engines and boilers for Messrs. J. F. Wilson & Co.'s boat. They are reported to have a large repair job on hand at Malta which will necessitate sending out a considerable number of men.

Hartlepool.

Messrs. Irvine's Shipbuilding and Dry Dock Co., Ltd., continue to be very busy. They have secured the contract to build two fine steamers for Messrs. Elder, Dempster & Co., Liverpool, which, with the work on hand, must keep them busy all through next year. The dry dock has also been kept very busy with repair work.

Messrs. Richardsons, Westgarth & Co., Ltd., have recently booked some very good orders. Amongst them are two sets of quadruple-expansion engines and boilers for two steamers, one to be built by Messrs. Priestman & Co., Ltd., Sunderland, and one by Messrs. Sir R. Dixon & Co., for Messrs. Howard, Smith & Co., Melbourne. Only the engine, however, for the latter steamer will be built at Hartlepool. They have also booked an order for a large turbine installation and are very busy with the Contraflo system, both for land and marine work. All departments of this firm are now very busy and it is expected they will have a prosperous year in view of the amount of work on hand.

THE HUMBER AND DISTRICT.

(From our Own Correspondent.)

IMMINGHAM Dock belonging to the Great Central Railway Company situated in the Humber within a short distance of Grimsby, is being rapidly pushed forward, and will be opened for shipping early in the new year. The dock is being well fitted up with cranes and coal hoists for the rapid discharging of grain cargoes and hoists for loading coal cargoes. There have been at intervals this last month several steamers bunkered alongside the quay in the river, notably the large steamer *Toronto*, of the Wilson line, which left Hull and bunkered at Immingham and sailed for Bombay fully loaded.

Sea-going Engineers, sailing in the Lancashire & Yorkshire Railway Company's steamers, running between Goole and the Continent, have been asking for an advance in wages for the last two years and not obtaining a reply to their demands the crisis at last arrived. As the steamers arrived the engineers gave the Company twenty-four hours' notice according to the Board of Trade rules, with the result that a conference was granted and held to discuss the matter with the Company; the engineers have returned to their respective ships.

Goole New Dock. In the early part of the new year the water space in the docks will be considerably increased by the opening of the new West Dock. It is about twice the size of the next largest dock in the port [illegible] yards long by [illegible] yards in the narrowest part. At the present time the finishing touches are being put to the large coal hoist capable of lifting a compartment boat carrying 40 tons, and discharging its contents into the hold of a coasting vessel in five minutes.

Goole Shipbuilding and Repairing Co., Ltd., launched from their shipyard a handsomely modelled new cargo steamer 224 ft. 6 in. by 32 ft. by 14 ft. 6 in. moulded, built under Lloyd's highest class. Triple expansion engines and boiler with forced draught have been fitted by Messrs. Richardsons, Westgarth & Co., Ltd., of Middlesbrough. The owners are Messrs. Stocks, Turnbull & Co., Kirkcaldy. She was named *Abbotshall*. This firm are keeping fairly busy with new and repair work.

Messrs. Cochrane & Sons, shipbuilders, Selby, are still going ahead booking orders for Humber and other owners' trawlers, drifters, etc.; in many cases they cannot guarantee delivery till well into the year. The firm recently launched the trawler *Baldur* 135 ft. by 28 ft. 6 in. by 13 ft. 3 in. moulded, for Mr. Peter Thorsteinson, Reykjavik, Iceland, which will be replete with all the latest improvements for the fishing trade. Powerful triple expansion engines by Messrs. Amos & Smith, Ltd., of Hull, will be fitted and the vessel has been built to Lloyd's rules.

Messrs. Amos & Smith, Ltd., engineers and boilermakers, have had a record year of output of machinery, boilers, auxiliary engines, etc. They have completed and got to sea twenty-eight sets of triple expansion engines and boilers of a total of 13,440 i.h.p. They have also booked several more sets of trawler and tug vessels machinery, and with the orders still unexecuted, they have sufficient new work to carry them well into next year. They have been exceedingly busy with repair and dry dock work; the branch shop at Alexandra Dock is also well to the fore with repair and graving dock work.

Messrs. Cooper & Co., Ltd., engineers and boilermakers have had a splendid month with dry-dock repairs, and had to engage the Railway Company's docks several times during the month. The s.s. *Parana* has undergone extensive repairs in her holds, receiving new insulation, a great amount of wood work and other general repairs. The Company's moulding and boiler shops have been greatly taxed with repairs, etc. The firm's own graving dock has been very much engaged with coasting vessels; the branch shop on Alexandra Dock has been fully employed with graving dock repairs and opening out engines and boilers for Lloyd's survey.

Messrs. Woodall & Co., engineers and ship repairers, have had a good month; their patent Handibloc is coming well to the front amongst shipowners and warehouse people. The small forging department is fully employed forging small stern posts for different yards. The Company has men working for the Corporation.

Messrs. The North-East Coast Engineering Works, Ltd., have been busy on the following steamers:—The s.s. *Randelsberg* was run down in the river and had under water for some time; she was finally lifted and docked in the Alexandra Graving Dock and extensive repairs were effected on her; also boiler and engines were opened out and thoroughly put into working order. The vessel was thoroughly refitted inside, such as cabins, berths, saloon and general upholstering. The s.s. *Medomsley* has undergone repairs for damage and heavy repairs have been executed on s.s. [illegible] s.s. [illegible] s.s. *Alnwick*, s.s. [illegible], s.s. [illegible], s.s. [illegible] *Hereford*. The s.s. *Highland Chief* of the Nelson Line, Liverpool, has undergone heavy repairs to engines and boilers; also refrigerating machinery has been opened out for Lloyd's inspection. This firm early in the new year are opening branch works at Goole.

Messrs. C. D. Holmes & Co., Ltd., engineers and boilermakers are exceedingly busy building machinery and boilers and their patent large steam [illegible] for trawlers, etc. The orders on the firm's books will take them well into the year to execute. A fair amount of repair work at the docks has been in hand. The branch shop at Alexandra Dock has been busy overhauling several local and other steamers.

Messrs. Stewart & Craig, engineers and smiths, have been fairly well employed on the following steamers—S.S. *Arthur*, s.s. *Minnie*, s.s. [illegible] *Hartington* new plates several in the boilers and new frames fitted, s.s. [illegible], s.s. *Ellaston*, s.s. *Frode*, s.s. *Annie Therse*, s.s. [illegible], s.s. *Borgany*, s.s. *Minnie*, s.s. *Mercurius*, s.s. [illegible]

[illegible] The firm have several enquiries from shipowners for graving dock.

Thomas Tate, engineer and boilermaker, has had a good [illegible] and steam [illegible] have been opened out [illegible]

The Fish or St. Andrew's Dock. All the trawler company's works of [illegible] this dock are fully employed [illegible] engines and boilers for [illegible] the patent slip situated on this particular dock (N.E.R. Company) are fully booked up.

[illegible] Line have given out in order for a [illegible] tons [illegible] to be built at Port Glasgow for their general cargo [illegible]

Messrs. Brown Atkinson steamship owners of Hull have placed an order with [illegible] Shipbuilding Co. of Hull for a [illegible] steamer of [illegible] tons.

SOUTH OF ENGLAND AND ISLE OF WIGHT.

(From our Own Correspondent.)

The Union Castle Steamship Co.—It was definitely announced on the 15th of last month that all the ordinary shares of this Company had been purchased by the R.M.S.P. Co., of which Sir Owen Philipps is Chairman. This announcement puts a stop to the persistent rumours which have been in circulation for the past two months concerning the U.C. Co., and emphasises the progressive policy of the R.M.S.P. Co. The Union Castle Co. have very handsome offices and large workshops in the Docks at Southampton.

The R.M.S.P. "Arcadian."—This magnificently appointed vessel arrived at Southampton from Belfast on the 18th December, and sails on the 3rd of this month for the West Indies and Bermuda. As announced last month she will make trips to the Norwegian Fjords and the Mediterranean in the summer. She has been specially fitted out for the business of an ocean cruising yacht by Messrs. Harland and Wolff.

The S.S. "Nile."—Last month the R.M.S.P. Co. disposed of this vessel to the Pacific Mail Steamship Co., of San Francisco and New York. The *Nile* was built by Messrs. J. and G. Thomson in 1892 for the Brazil and River Plate Mail Service of the R.M.S.P. Co. She is 420 ft. long and has a tonnage of 5,534 tons. A very sad accident occurred just prior to the vessel leaving her berth in the Dock, the 3rd Engineer being killed outright by the L.P. lever link striking him on the head whilst he was making an adjustment to a water service cock.

The Great Western Railway Company's channel steamer *Roebuck* left Southampton last month after completion of extensive repairs by Messrs. Harland & Wolff. The vessel grounded whilst going about 19 knots, and the damage sustained necessitated the renewal of practically the whole of the bottom plating, and a stay of about two months in dry dock. The other big job which the firm had in hand [illegible] the *[illegible]* owned by the Cie Generale Transatlantique has also been completed and the vessel left to take up her accustomed station.

S.S. "Vandyck."—This vessel arrived at Southampton about the middle of last month from the River Plate, and discharged part of her meat cargo, afterwards proceeding to Liverpool to complete discharge. She is the first of three sisters, which will run from Liverpool under the new arrangement with the R.M.S.P. Co. and Messrs. Lamport & Holt, Ltd. She will be followed by the *Vauban*, which is nearly completed, and the *Vestris*. All three vessels have been built by Messrs. Workman, Clark & Co., Belfast.

The "Olympic" arrived at Southampton on the 16th of last month after a very satisfactory voyage to and from New York. She sailed again for America on the 29th, thus completing her quick turn round.

Messrs. J. Samuel White & Co., Ltd., East Cowes, Isle of Wight. H.M.S. *[illegible]* has carried out satisfactory official trials, and was running subsidiary trials last month preparatory to [illegible] to the Admiralty. The Revenue cruiser [illegible] on the 9th of November for Cuba and Las [illegible] at Las Palmas. Last month three steam launches for Customs service at Rio de Janeiro completed very satisfactory official trials, and were shipped to their destination. Work continues plentiful in the boat building department.

Messrs. Simpson, Strickland & Co., Dartmouth, South Devon. Last month this firm despatched two very fine [illegible] ft. launches for use on Atlantic liners running pleasure trips. The launches are fitted with triple engines and oil fired boilers. A 30 ft. launch was recently despatched to the East. On trial at Dartmouth she averaged 16 knots. A 43 ft. steel launch with compound engines and water tube boiler has just been shipped to South America. Boats in hand include a motor launch for the Admiralty, two for South America, a 30 ft. steel towing launch, a 25 ft. oil fired steam launch and the frames, steelwork, machinery, and fittings for a 68 ft. composite boat to be built abroad. A 36 ft. launch for South America was undergoing trials last month and will shortly be despatched; she is a duplicate of one supplied to the same port some years ago.

Messrs. John I. Thornycroft & Co., Ltd., Woolston. **Admiralty Work.**—The machinery of H.M.S. *Ariel* has been opened out for inspection, and the vessel will be delivered into H.M. Service at the beginning of January. The keels of both the steel paddle tugs (690 tons) are laid, and the frames are being erected. The two 60-ft. steel barges, as also the 80-ft. barge for the Crown Agents, were shipped last month. Several important orders for new work have been received during the month, amongst them four torpedo boat destroyers for the British Admiralty, and boiler material for two foreign destroyers. The general work in hand has made good progress, and the repairs department has been well occupied upon troopships, yachts and dockyard craft.

THAMES.

(From our Own Correspondent.)

Shipbuilding. Nothing has leaked out when we go to press as to possible orders for this district from the Admiralty. Meetings in support of an allocation of work here have been numerous. Borough Councils have taken action on the matter. Greenwich has naturally been to the front, and Stratford is another example, at the latter meeting Mr. Hill, the chairman of the Thames Ironworks, is reported to have said he was ready to put down an armour-plate works and that this would give the Company the opportunity of quoting as low as North-country firms, because the Company would then be independent of the armour plate combination. Meantime opposing firms are petitioning the Government to keep to the present condition of affairs in this particular. The shares of the Thames Ironworks rose five points lately, which was taken to indicate the placing of an order.

Further Labour Troubles.—There have been minor troubles at the docks again over the Rollit award and stevedores came out in consequence. The fitters of the Port of London Authority demanded a higher rate of wages, several trade unions being affected and bringing 250 men out on strike.

Shipping Companies.—The P. & O. Company issue their annual report, which shows a surplus of £410,915. The distribution for the year is equivalent to a dividend of 9 per cent. and a balance of £67,615 is carried forward. There has, according to the report, been a great improvement in trade. There has been a deficit in the Bombay and China line, but, as we have said, on the whole the outlook is favourable for the Company. The Orient Co.'s report shows a credit balance of £174,751 which allows a dividend of 5 per cent. on the deferred shares. Mention is made of the *Orama* the new boat which sailed for Australia on Nov. 10th. This is the first year of working under the new contract to carry the Commonwealth mails and the 12,000 ton boats have met with great acceptance. The new boat is 13,000 tons and triple screw, which shows the success these vessels have attained in carrying one-class passengers to the Antipodes, and also as freighters.

The late Mr. Edward Pembroke.—An influential committee of shipowners, shipbrokers and underwriters has been formed to arrange for a suitable memorial to the late chairman of the Shaw Savill & Albion Company, and a late president of the Chamber of Shipping. Mr. Jno. Carlisle, of 4 St. Mary Ax. is hon. secretary of the fund which it is proposed shall take the form of some useful object connected

with the philanthropic interests with which Mr. Pendrick was identified.

New Lambeth Bridge.—The London County Council will next year apply to Parliament for authority to reconstruct Lambeth Bridge at an estimated cost of £[illegible]. This sum, however, includes no architectural decorations. The structure will be a steel girder bridge [illegible] in width, and the total cost is less than one-half that originally proposed.

The City Steamboat Co.—This is the name the Tranmere steamers trade under, and previously owing to the fine summer we had there is a dividend of [illegible] per cent. announced at the annual meeting held in the Merchants' Hall. This is the first year since 1[illegible] that there has been a profit on this undertaking, and constitutes a record.

MERSEY AND MANCHESTER SHIP CANAL.

(From our own Correspondent.)

THE Mersey continues to receive its share of mercantile and Admiralty work. The dock and coaling facilities are also keeping well abreast of the times, special reference being made to them in the issue.

Messrs. Cammell, Laird & Co.—In addition to the large number of orders already in hand in the various departments of this yard several important orders have been booked recently. Chief amongst these may be mentioned the turbine machinery and boilers for a first-class battleship to be laid down at Portsmouth, a similar order having gone to Messrs. Hawthorne, Lister & Co. The twelfth one of the new special destroyers is also to be built in Birkenhead, the machinery being supplied by Messrs. Parsons. Another interesting order recently received being from the Royal Mail Steam Packet Company for a meat liner for the River Plate. This vessel will have the latest type of refrigerating plant, supplied by the Liverpool Refrigerator Company, and will be improved in hanging meat carcases down to such vessels as the Nelson steamers, where deep draught prevents them

H.M.S. *Adamant*. Tender to submarine depot ship. The first vessel of a new class. Recently completed for trials. Built by Messrs. Cammell, Laird & Co.

proceeding up the River. This vessel will also be self-propelled, having twin engines. The *Adamant*, tender to submarine depot ship, has very successfully passed through her 36 hours' full power and [illegible] trials, while the *[illegible]* is now undergoing the running trials at the time of writing. Three [illegible] are also ready for trial. The Australian liner *[illegible]* and the *Ad[illegible]* are making rapid progress, as is also the floating dock for Portsmouth. The Newfoundland liner has been laid down at Tranmere, while the L. & N. W. Railway steamer is making rapid progress at the Birkenhead Yard. The tug *[illegible]* for the Port of London is now undergoing trials and will shortly be delivered. The repair department has in hand the *City of [illegible]*, which has been re-boilered, the *Tranmere*, luggage ferry steamer, has had new stern frame also. A frame [illegible] the Greek steamer *[illegible]* is being repaired at Birkenhead Dock, after which she will be brought to Birkenhead.

Messrs. H. & C. Grayson.—Another large contract has been secured by the enterprising firm to be carried out for the Cunard Company. It is only a few weeks since the *[illegible]* left Messrs. Grayson's yard. The *Mauretania* is now being repaired in the Cunard Dock after grounding in the Mersey. The cotton cargo in her coaling [illegible] is quite spoiled and had to be renewed. The Canadian Pacific steamer *[illegible]* is in hand in the Langton Graving Dock, after grounding in the St. Lawrence. At Garston a number of barges are being shipped to South America, while the steamer *Avdna* is undergoing damage repairs.

Messrs. Clover, Clayton & Co.—Many orders for repair and survey work are in hand and are shortly due at the Birkenhead graving docks of this firm. The coasting steamer *Calchfaen* was temporarily repaired in Douglas Harbour and then dry docked here after collision with the *[illegible]* off the Chicken Rock. The steamers *Mo[illegible]* and *Glo[illegible]* are undergoing extensive repairs, the latter having been ashore in the Ribble off Preston.

Messrs. David Rollo & Sons.—Recent orders secured by this firm at their Fulton Engine Works include new boilers and extensive engine repairs, also hull renewals to the Langlands steamer *Princess Ena*, also new boilers having been fitted to the *Princess Sophia* for the same owner, also to the Elder Dempster's steamers *Ikale* and *Ni[illegible]*. New boilers have been supplied to the Dock Board's Pumping Station and an experimental marine boiler for Liverpool University. A large number of the "Hordeta" patent [illegible] tank manhole doors are in hand, this firm being the sole makers. Various ship repairing contracts are also in hand.

Electric Welding.—An exhibition was given at the Salthouse Dock on December 13th of electric welding on the Siemund & Wenzel system for steam boilers, etc. Representatives of various steamship companies, etc., were present and the advantages were commented upon very favourably.

The David Wilson Noiseless Winch.—The most striking feature about the average winch is the amount of noise caused by its working. As a proof of the claims of the Wilson winch, its adoption by many of the leading shipowners may be cited. Amongst those using it may be mentioned the C. P. R. C., Allan Co., Nelson Co., G. T. Rly. Co., and recently, in addition, the Union Steamship Co. of New Zealand.

The Cunard Co.—The *Lusitania* left Liverpool on Saturday, December 9th, in place of her sister ship, to make the round trip to New York and back in 12 days. The *[illegible]* left the Tyne for speed trials on December 8th, which were successfully got through. This vessel left for the Mersey with many officials on board later and is expected to make her maiden voyage on January 13th.

The Blue Funnel Line.—The death occurred suddenly on November 28th, at Aigburth, of Mr. Alfred Holt in his 82nd year. Mr. Holt founded the famous line of steamers in 1862 with the *Dumbarton Castle*, *Saladin* and others, between Liverpool and West India ports. He also served on the Dock Board from 18[illegible] to 190[illegible], a period of 26 years.

Isle of Man Steam Packet Co.—The guarantee fund at Ramsey has been fully subscribed for the proposed ninety minute service between Ramsey and Whitehaven. The service is proposed to be a trial one on account of the low water. It is expected that this Company will take up the service, once the landing difficulties are overcome.

The Brocklebank Line.—Captain Wm. Ray, marine superintendent of this Line, retired on December 1st after fifty-seven years' continuous service. Captain Ray is in his 7[illegible] year and at the age of 22 years took command of the barque *Rom[illegible]* upon which vessel he served his apprenticeship. He had been superintendent since 18[illegible].

The Manchester Ship Canal.—From January 1st the rates of the Canal Company will be increased 10 per cent. for quay porterage, warehousing, etc., on all goods except timber, grain and cotton. The Company are thus falling into line with other ports in the United Kingdom.

Liverpool Engineering Society.—At a meeting of this Society on December 14th an interesting paper on the "Safety of Ships at Sea" was given by Prof. W. S. Abell, of Liverpool University. Mr. A. Willett Bates, President, was in the chair.

White Star Line.—It is reported that [illegible]

steamer for the Australian service has been placed, with a gross tonnage of 18,000 tons. She will be fitted with a combination of turbines and reciprocity engines, and will be half as large again as the "Suevic" class at present on the route.

NORTH-WEST OF ENGLAND.

(*From our Own Correspondent.*)

Barrow-in-Furness.—Not much change has taken place in the shipbuilding trades of this district during the past month. No official information is to hand as to new orders, but it is looked upon as certain that Messrs. Vickers, Ltd., will get an order from the Admiralty for an improved "Dreadnought" inasmuch as theirs was one of the two lowest tenders, and Messrs. Beardmores, of Dalmuir, was the other. Messrs. Vickers, Ltd., are, of course, large owners in the Dalmuir yard, and it is possible to build two ships in these yards at very much less cost. Probably the orders for "Dreadnoughts" would have been given out before now, had it not been for the efforts which have been made by the Thames Ironworks Company to secure one of these ships, at a much greater cost than the Barrow or Dalmuir tenders; but after the statement of the Right Hon. Winston Churchill, the new First Lord of the Admiralty, he was bound, in giving out orders, to consider the pockets of the ratepayers. It is difficult to see how he can place one of these orders on the Thames at an extra cost, as is stated, of from £50,000 to £70,000. Of course it is known that if the Thames shipbuilding yard closes it will throw some thousands of men out of employment, but there is a big demand for skilled labour at Barrow and in other shipbuilding centres, and possibly some trade can be started in Canning Town which would be more commercially successful than is possible under new conditions in the shipbuilding industry.

The "Princess Royal."—The work of completing this smart battleship-cruiser for the Admiralty has been making very rapid advance during the past month. There is a night and day shift at work on the vessel, and the immense amount of work in progress is evidenced by the many hundreds of workmen who leave the ship at meal hours. The turbines have been fixed, and the boilers have been practically completed, so that the vessel will be able to go through her dock trials probably before other departments of the vessel are completed. Before the *Princess Royal* is ready to proceed on her trials, the result of the trials of her sister-ship, the *Lion*, will be to hand. The engines for this vessel have also been built by Messrs. Vickers, Ltd. Both installations represent 70,000 indicated horse-power, and a designed speed of 28 knots. It is confidently expected that both ships will make a speed of little short of 30 knots.

The Japanese Battleship - Cruiser.—This monster ship, larger in many respects than the *Princess Royal*, is growing apace and is rapidly showing her immense side in the shipbuilding yard. It is generally believed the Vickers' Company are anxious to get her launched as speedily as possible, because the ways on which she is being built are required for an even larger ship. It is probable, nay almost certain, she will be launched on one of the high tides in March, by which time the *Princess Royal*, lying under the 200-ton crane in the Buccleuch Dock, will be ready for her trials. There is plenty of material available to build into the ship, but there is a scarcity of skilled workmen, and the same complaint is to hand from other shipbuilding centres throughout the country. It is fortunate there are no industrial quarrels at the moment, as it would impede progress at a time when the trade is busier than it was ever known to be in its history. But some reason why there are no troubles of this sort to contend with at present may be found in the fact that the scale on which wages are now paid is much higher than it has ever been, and the general conditions such as leads to the contentment of the men.

The Turkish Battleship.—During the past month the ceremony of laying the keel of the Turkish battleship building at Barrow was performed in the way peculiar to the Turks, and now the work of building up her frames, of plating her lower strakes, and riveting has been begun in considerable earnest. This can readily be understood, seeing that the vessel is to be delivered in twenty-one months from the laying of her keel. Many of the essentials for rapid construction have been seen to in the provision of the material required, so that so soon as anything is wanted it is to hand, and there is consequently no waiting. Messrs. Vickers, Ltd., have in this respect, and in other directions, valuable resources which help them in the celerity with which they can complete a job. The vessel will probably be engined and fitted up generally in the Devonshire Dock, leaving the fitting-up of larger ships for the berth in the Buccleuch Dock. This new warship is to be named *Reshad i-Hamiss*.

Floating Dock for Canada.—This monster dock is engaging the attention of many members of the black squad. She will soon be ready for launching in sections. These will then be riveted together in Walney Channel, and the dock will be towed out to the St. Laurence in time to enter that river when the frost breaks up. The men engaged on this dock are wanted on some of the big ships which are being built in the Vicker's yard.

Submarines.—The "D 6" submarine built for the British Navy has been delivered by Messrs. Vickers, Ltd., to Portsmouth. She is a novelty in the fact that she carries guns which can be elevated by the opening of a hatchway, discharged, and then returned back into the hull of the vessel to enable her to submerge herself. The "E" class, which is building at Barrow, will be similarly fitted, but the latter class are much larger than the members of the "D" class and will be able to take long sea voyages. The new Diesel engine finds plenty of work in the Barrow yard. It is being fitted in submarines, and local engineering experts consider it as likely to be the successful engine for this purpose in the future.

The Hæmatite Trade.—This trade, after a long spell of inactivity, is now booming. Orders are coming in more freely, and prices are higher at 65/- cash.

Shipping.—There is still marked depression in the shipping trade, and exports have gone down 181,345 tons on the year.

BELFAST.

(*From our Own Correspondent.*)

The Past Year, and Prospects.—The big volume of new tonnage launched from the Belfast shipyards during 1911 indicates a highly satisfactory year's work, and, with the amount of orders at present in hand, and enquiries that are more than likely to materialize, it is pretty safe to predict that these figures, or something approaching them, will be repeated in 1912, and for at least a year or two succeeding. Rarely, in fact, have the Belfast shipbuilders been booked up with contracts for so long a period ahead as they are at the present time. The vessels put in the water during the past twelve months represent tonnage of the highest class, including as they do such fine examples of naval architecture as the White Star leviathan *Titanic*, the Union-Castle liner *Galway Castle*, the *Demosthenes* for Messrs. Geo. Thompson & Co. (Aberdeen Line). the Royal Mail Steam Packet Company's *Arlanza*, the Holt liner *Anchises*, Messrs. Lamport & Holt's *Vandyck*, and a number of fruit-carriers of the most up-to-date type.

Messrs. Harland & Wolff.—In last month's issue of *The Marine Engineer* attention was called to the rumours current anent the placing with the Queen's Island firm the contract for the construction of a White Star liner to eclipse in point of size anything afloat or at present building. I am now in a position to state that Messrs. Harland & Wolff have started operations in connection with a new White Star liner of greater dimensions than those of the sisters *Olympic* and *Titanic*. No precise sizes are at present available for publication, but it may be assumed that the length will be somewhere in the close neighbourhood of 1000 feet. In addition to this vessel, Messrs. Harland & Wolff have the contract for a steamer of 18,000 tons for the White Star Company's Australian service. While on the subject of leviathans mention may be made of the reports current a short time since regarding bringing the *Mauretania* to Belfast for the necessary repairs consequent on her stranding in the Mersey. In certain quarters it was insinuated that there never had been any real intention of taking the vessel to Belfast, but Lord Pirrie's telegram in reply to enquiries made by the *Belfast Evening Telegraph* shows that there was at one time more than a mere possibility of his firm being entrusted with the *Mauretania* repairs. The telegram reads as follows:—

The Marine Engineer

And Naval Architect.

LONDON, FEBRUARY, 1912.

THE NAVY BOARD

THE interest that all marine engineers must of necessity have in the welfare of the British Navy must have been keenly aroused in all that has taken place during the past two years, as to changes that have occurred in the administration of our first line of defence. Every right thinking individual who recognises his proper responsibility to the nation generally, and to himself in particular, can but be deeply impressed with the necessity of preventing anything from standing between the nation and the proper dominant control on the sea, which is an essential safeguard to our national existence. In looking at the matter broadly, one appreciates the fact that owing to international policy a nation's responsibilities are not merely domestic, but extend to our relationship to other nations. The conditions which existed some years ago when Great Britain and France were the only two great sea powers have passed away owing to the expansion of the German navy, and it is recognised that this expansion is going to continue as a definite policy of a nation which has progressed by leaps and bounds for the past fifty years. The marked progress in our naval policy since 1902 has been such that when a halt appeared to have been made for the past two years, one was led to wonder what would happen when Mr. Churchill followed Mr. McKenna as the First Lord of the Admiralty. Since his accession to this office it must be confessed that he is as much impressed with the responsibilities of his position as any of those who preceded him, and any doubts as to whether his policy would be a progressive or a retrograde one are now cleared away. The selection of the members of the new Board should clearly demonstrate the fact that the First Lord means to ensure progressive action. The whole of these officers are possessed of recent sea experience, and have a full knowledge as to the existing organization and discipline of the *personnel*, and further, which is probably most important, they are acquainted with the working conditions and capabilities of the navy, among which may be counted any weakness or shortcomings which experience has brought to light. In this connection the war scare of last year must have been particularly useful. The scheme set out in the memorandum issued in January for the formation of the Naval War Staff is a masterful evolution of a body from material that already existed in the Naval Intelligence and Mobilization Departments of the Admiralty, and it may be said that general satisfaction has been expressed as to the practicability of the scheme. It is satisfactory to note that the idea of the war staff having authority in matters relating to strategy, and its ability to enforce their views on the whole of the Board of Admiralty, has been entirely avoided, and the general control exercised by the Board for so long now will not be affected by the changes brought about. We believe that definite plans for the setting up of a naval war staff were in process of formation even before Lord Fisher left his post, so that the matter has not been hurried through in any way, but has evidently been dealt with in a most careful and deliberate manner. It has been pointed out that the memorandum is couched in language much more rhetorical than usually obtains in documents of this character, which are generally of very unimpassioned expression, but it seems to us that this characteristic is indicative of the dominant feature which pervades the scheme. For example, the incisiveness of the differences between naval war and war on land is illustrative of the general treatment of the subject. It is pointed out that the execution and control of fleet and squadron commanders is more direct and personal than that of generals in the field, especially under modern conditions, while the art of handling a great fleet with deft and sure judgment is the supreme gift of the admiral, so that practical seamanship must never be displaced from its position as the first qualification of the sailor. The War Staff formation does not set up new standards of professional merit, or create a new road of advancement to a different class of officers, but it is to be a means of preparing and training officers who arrive or are likely to arrive by the excellence of their sea service, at stations of high responsibility for dealing with the more extended problems which await them. It will be used as a means of sifting, developing, and applying the results of history and experience, for use as an aid and a guide to those who have to determine in peace or war the naval policy of the Country. The general utility of the War Staff is summed up in the following words from the memorandum:—"It is to be a brain far more comprehensive than that of any single man, however gifted, and tireless and unceasing in its action, applied continuously to the scientific and speculative study of naval strategy and preparation. It is to be an instrument capable of formulating any decision which has been taken or may be taken by the executive in terms of precise and exhaustive detail." It is devoutly to be hoped that the excellent intentions which the memorandum set out may be fully carried out in practice, and the more it is understood the more it will be welcomed by those who are primarily affected by its provisions.

"HAWKE"—"OLYMPIC" COLLISION.

THE evidence and the judgment in this case has created a vast amount of interest among the public in general and the shipping community in particular, and since the judgment was given

large amount of correspondence has been carried on in the public press. We have just received some letters on the subject, but owing to the fact that the owners of the *Olympic* have lodged notice of appeal against the judgment of the Admiralty Court, thus making the matter *sub judice* again, we shall refrain from publishing such letters, for the present, at least, until the judgment of the Court of Appeal has been given or the appeal been withdrawn. We can only say that we are not surprised at the course adopted by the owners, and we await with interest the result of the new turn in the events.

EXAMINATION OF ENGINEERS.

A NEW edition of the Board of Trade Regulations relating to the examination of engineers has been issued containing a reprint of the 1908 edition and a few alterations and notice of the new rule which comes into force in January, 1915, and reads as follows: "For a 2nd class certificate the applicant will be required, in addition to the apprenticeship above described or the alternative sea service, to have served 18 months at sea as engineer on regular watch in the main engines or boilers of a foreign going steamer of not less than 66 N.H.P.; or 27 months in a home trade steamer of not less than 66 N.H.P. For a 1st class certificate, the candidate will be required in addition to the qualifications required for a 2nd class certificate (1) to have served at sea for 18 months with a 2nd class certificate of competency or service in regular watch on the main engines or boilers of a foreign going steamship of not less than 99 N.H.P. as senior engineer in charge of the whole watch; or (2) to have served at sea for 27 months with a 2nd class certificate of competency or service as first engineer of a home trade steamer of not less than 99 N.H.P.; or three years with a 2nd class certificate as second engineer of a home trade steamer of not less than 99 N.H.P.; or (3) to have served 3 years 9 months with a second class certificate as third engineer of a home trade steamer of not less than 99 N.H.P., if, during the entire period, he has been the senior engineer in charge of the whole of a watch on the main engines and boilers." The regulations for the old service certificate still remain in force. There are 310 questions in the appendix to which candidates are referred so that they may have an idea of what is expected of them. Engine room artificers who have served in the Navy may be admitted for examination with a view to certificates on similar terms to engineers in the mercantile marine. The list includes artificer engineers, chief engine room artificers, engine room artificers and mechanicians. It does strike one as a peculiar condition of affairs that while engineers are being elevated to a higher plane both in respect to shore service, experience and technical knowledge and lengthened sea service in order to better equip them for their duties in connection with the upholding and commercial working of the mercantile marine thus helping to maintain commercial patriotism, the engineers and the engineering staff in the Navy are not being similarly treated with the same object in view. A smattering of engineering and a gloss of technical experience are not calculated to give grit and nerve to tackle emergencies.

Mr. John Chambers, M.I.N.A., of Lowestoft, has acquired the premises and business of Messrs. Davis & Co., Ltd., of Commercial Road, Lowestoft, manufacturers of well known types of steering gears, capstans, windlasses, etc. The business was founded about 1876, and was originally carried on at Garford Street, Poplar, E., but was transferred to the present works in 1900. Some 4,000 vessels have been fitted with "Davis" steering gear. Mr. Chambers has been in business as a shipbuilder at Lowestoft since 1888, and his firm have launched over 400 craft of various types, chiefly steam fishing vessels.

MARINE REFRIGERATION.

IN the article published last month under the above heading we raised the question of the importance both to the meat shipper and to the underwriter of expert independent survey of the plant and insulation of frozen meat freighters, and this month we desire to carry this question a stage further, and to consider what other steps the prudent shipowner may take to ensure his vessel being in the strict sense of the term, seaworthy and fit to carry frozen produce.

It is obvious to anyone with the most elementary acquaintance with engineering matters, that no survey, however thoroughly or skilfully conducted, can be effective without the intelligent co-operation and assistance of the man in charge of the plant at sea. The stay in port is so short in most cases that the greater part of the time is taken up by the opening up and overhaul of the machinery, and little or no opportunity is afforded the surveyor of seeing the working of the machine under sea-going conditions. Hence he is largely dependent for information and data on the official logbook of the run and on the man in charge of the plant. For reasons which are obvious the logbook is at best a dubious source of information; the incompetent engineer naturally faking the record if unable to rectify errors in the functioning of his charge, and unless this faking be so glaring as to arouse suspicion, or be obviously proved false by the bad condition of the produce, minor defects which affect seriously the economic running of the plant, may easily be overlooked, and persisting from voyage to voyage, in the end lead to serious trouble. For these reasons it is essential that the installation should be in the hands of skilled, intelligent engineers, who have made a special study from both theoretical and practical sides of mechanical refrigeration.

Such men cannot be obtained for the wage of an office boy or junior clerk, and unhappily some ship owners seem to think they can.

It is notorious that several lines of steamships entrust the care of, and responsibility for the valuable plant, and cargo to men who are content after years of training to work for £8 to £10 per month, a wage very little higher than may be earned by a third-rate fitter ashore, and who rank with the third or fourth engineers, whose responsibility is limited, and who in most cases have little or no special knowledge or training. When in addition, as in too many cases no second "freezer" is provided, and the man in charge is required to keep watch for the whole time the machine is running, with the assistance of a greaser, it is obvious that engineers as a body do not regard a "freezer's" job as anything to be desired, and prefer to be attached to the "main."

When a man in such a position possesses brains and energy it is small wonder that he clears out as soon as possible in search of more remunerative employment, and that changes are taking place in the "personnel" of the department every voyage, to the detriment of the plant. These constant changes, and the influx of raw and inexperienced men, throw a grave and onerous responsibility on the chief engineer who is already fully burdened in these days of undermanning, by the cares of his own department.

It is only fair to say in this connection that some of the leading firms have realized the importance of the "frig." engineer, and not only have raised his status and, of course, his salary, but have provided ample assistance, but unfortunately the ships so dealt with are as yet in a minority and much remains to be done.

The recognition of the "freezer" by the B.O.T. with the issue of a certificate for refrigerating knowledge, and a general demand on the part of underwriters that frozen meat freighters should carry a man so qualified in charge of the plant, can only be a matter of time. It is essential that every effort should be made in the meantime by those responsible to induce capable men to be content to remain on the "frig." plant, and not be anxious to get back to the "main," by the improvement in status and salary of the refrigerating engineer and by some system of promotion which would necessitate the chief engineer being

a man who had sailed for a reasonable period as chief "freezer." An ideal and quite practicable state of affairs would be to insist on a chief qualified as above outlined in full control of the machinery and responsible for the cargo, efficiently assisted by a staff of properly qualified refrigerating engineers in actual charge of the plant. Such an arrangement would raise the status of the refrigerating engineer, would provide an incentive to obtain refrigerating experience at present lacking, and would above all ensure competent handling of meat cargoes. Another much needed reform will be to place the insulated holds under the control of the engineers absolutely. In many vessels at present, the responsibility for the cleaning, inspection and repair of these holds is vested, no doubt by tradition, in the deck staff, with the responsibility for the condition of the cargo placed in the hands of the chief engineer. Such a dual responsibility leads, as it must do, to friction between the departments, which adds to the existing antagonism between the topsiders and the black squad, to the detriment of the interests involved.

Making all allowances it must be obvious that the navigating staff are as a rule not qualified by knowledge to attend to the insulation, and as a result the holds are in such a condition that no degree of efficiency in the machine and its auxiliaries compensates for the losses occasioned by bad insulation, leaky hatches, and pipes covered with coal dust, and other foreign matter, which becoming dislodged stains the meat and produces defects for which the engineer is only too often responsible.

An instance of this kind of thing may be quoted, which frequently occurs. The sawdusting of the spaces when thawing down must be carefully carried out or the melted snow penetrates to the tank top insulation, and in course of time renders it so wet that the meat becomes mouldy. In the majority of cases this mould is attributed to the temperature being allowed to fluctuate, and in consequence the engineer is blamed and even accused of faking the log, when a complete survey would have revealed the true cause, and would have exonerated the technical man. If the hold were in his charge, the engineer would for his own protection have seen the above detail attended to. Occasionally the carriage of heavy cargo damages the insulation superficially, and as a result a leakage of charcoal dust spoils a few carcasses. Again the engineer is to blame. Such pinpricks are bound to irritate and annoy, and can all be avoided by the method we advocate.

These are matters which vitally affect the successful running of meat carriers, and with others no less important the writer hopes to deal in a future article.

The working arrangement recently entered into between the Federal Line and the N.Z. Shipping Co., whereby the latter company obtains control of certain vessels of the former line, was one which has been intelligently anticipated for many months, and its consummation will occasion no surprise to those in the know. What, if any, its effect may be remains to be seen, but if it leads to a more reasonable distribution of supplies of Colonial produce, and tends to less fluctuation of landings here, it will prove to be desirable from the point of view of all concerned.

The writer has received recently some interesting detail of experiments with distance temperature recorders of divers types, and purposes dealing at some future date with the matter in all its bearings, having regard to its importance in chilled meat carriers.

Messrs. Hall, of Dartford, in the course of a complimentary letter to this journal, have taken exception to some remarks by the writer, made in the first article of this series. In reply we would state that we had no intention of questioning the general method of brine distribution which is characteristic of Messrs. Hall's installations, and which the writer knows to be most complete and effective, but desired only to criticize some minor details of the particular installation dealt with, which is surely the main object of such an article as we published. We have only the highest praise to accord the plant of this firm, which has been amongst the foremost in the world in respect both of design and workmanship, and who have contributed in no small degree to bring mechanical refrigeration to its present state of high efficiency.

THE FLEETS OF THE MAIL LINES.

(From our Own Correspondent.)

The Amalgamation of Shipping Fleets.

THE trumpeting which followed the [illegible] of the purchase of the Union Castle [illegible] agreement of the Royal Mail and Elder Dempster Companies drew from Herr Ballin, the [illegible] of the Hamburg American Line, some [illegible] observations which have been strongly resented by the British shipping press. The main point of what Herr Ballin said was to the effect that although Sir Owen Philipps and Lord Pirrie are now in control of a number of [illegible] whose aggregate tonnage amounts to [illegible] quarter tons of steam shipping, the Hamburg American Company remains the largest single and [illegible] shipping organisation in the world. That this statement is literally true cannot be denied. But in making it the director of the Hamburg Line spoke of the [illegible] the connection between the various constituent companies of the International Mercantile Marine Company, and here I venture to think he was less accurate. It is true that the Combine kept alive the various companies which it bought up. But it did so advisedly and with great wisdom. For by doing so and at the same time getting the whole of their share capital either into the names of itself or its nominees it was enabled to keep alive the British companies which owned the vessels and so to retain the British registry of the vessels purchased. Unity of control was secured by the appointment to the general managership of Mr. Ismay, head of the firm which has achieved the greatest success of all the amalgamated concerns, and by the concentration of the headquarters of the various lines. In the result, whatever Herr Ballin may say, the whole of the combined property is vested in the Combine, and its management have absolute control of the whole of the fleets. What more could be achieved by the registration of the individual ships in the actual name of the New Jersey Company I fail to see, and there is practically the same homogeneity of control is reached by the American Combine as by the Hamburg Company. But it must be admitted that in regard to the Royal Mail interests such complete union is not as yet possible. Sir Owen Philipps and Lord Pirrie are directors of all the grouped companies, or a controlling proportion of the share capital of the purchased lines is held by one of the two dominating organisations—the Royal Mail and the Elder-Dempster Company. The position is one where effective co-operation is not only possible but certain, and that being so, it would seem that identity of interest and of action are ensured. Whether the associated companies blend or remain separate entities does not really matter as long as these two essentials are fulfilled, any more than it would matter whether the bulk of the share capital in a single company was held by the public or retained in the hands of those who had seats on the Board.

But there is one thing that does matter, and on that Herr Ballin was silent. The American Combine has a capitalisation of somewhere about [illegible] when it got control of say a million tons of shipping. The outlay was thus far in excess of the actual selling value of the individual ships. That is to say a large amount was paid for good will. In the purchase made by Sir Owen Philipps and Lord Pirrie this item of good will does not loom so large. I think the shareholders in the Union-Castle Steam Navigation Company only obtained ten per cent premium at most on the value of their holdings. The Union Castle shareholders may be happy in the security before the announcement of the deal. For the management of the Union Castle Company was a highly conservative one, and it is well known that it had accumulated reserves and a low valuation of its fleet, which whilst they made for security of dividend and for power to resist attack naturally tend to depress high prices on the Stock Exchange. Further than that the prospectus which the Elder Dempster Company issued in its desire to raise money to pay for its share in the new acquisition shows that the interests of the late Sir Alfred Jones were acquired at a price far below

what would now have to be given for them. [illegible] made the strength in the British Combination. [illegible] dated [illegible] always in the end [illegible] phenomenal [illegible] but [illegible]

The International Mercantile Marine Company

seems to be weeding out a number of vessels from its fleet. The liner *Southland*, built in 1889 at Dumbarton by Messrs. Denny & Co., has been sold to Messrs. J. W. Ward & Co., of Sheffield, presumably to be broken up. The *Southland* is a vessel of [illegible] gross register fitted with twin screws. She has been hardly employed in the St. Lawrence and American Line service of the Combine.

A much more important sale has been the transfer of the large passenger steamships *Romanic* and *Cretic* of the White Star Boston and Mediterranean Line to the Allan Company for service in the trade between the Clyde and North America.

The *Romanic*, which has already gone to the Clyde for the alterations required to adapt her for her new employment, is a twin-screw vessel of 11,347 tons gross register. She was built at Belfast by Messrs. Harland & Wolff in the year 1898 for the Dominion Line, her name being then *New England*. The *Cretic* is some four years younger. She is a similar ship though [illegible] tons larger, being of 13,548 tons gross register. She was constructed at the same yard as the other vessel. Her original name was *Hanoverian*, her first owners being the Leyland Line, who, I think, never had any other twin screw vessel. Then she was transferred to the Dominion Line, when she sailed under the name of *Mesaba* to Boston. Finally she entered the White Star fleet as *Cretic*, and now doubtless will receive yet another designation. Perhaps she will revert to her original name, for *Hanoverian* would fall into line with the Allan style of nomenclature. Indeed, the name has already been used in their fleet.

The P. and O. Company

knows how to do the right thing and to do it gracefully. Immediately after the stranding of the *Delhi* the chairman of the Company addressed a letter of acknowledgement for the services rendered by the crew of the French warship *Friant* on that occasion to the official heads of the French Navy at Paris, and immediately followed up the letter with a contribution of £500 towards the fund which is being raised for the benefit of the families of the three French men of warsmen who lost their lives in the work of rescue.

Not long after the announcement of the purchase of the Union-Castle Company by the Royal Mail a statement was circulated in the press to the effect that the P. and O. Company had obtained control of the Clan Line. But though this statement was at once denied another very important absorption really did take place. This was by the New Zealand Shipping Company. The New Zealand Company already owned some eighteen important steamships of a gross tonnage of about 120,000 tons. These include two triple screw steamers and twelve twin screws. The Federal Line has two new twin screw vessels of the purchase of the

Federal Steam Navigation Company

between ten and eleven thousand tons a piece, and eight other steamers all of which exceed 5,000 tons gross register. With them will continue to be run the steamers *Norfolk, Dorset* and *Suffolk*, which have hitherto worked in conjunction with them though remaining in outside ownership. The new purchase gives the New Zealand Company a footing in the Australian trade, whilst it extends its loading ports in this country by the addition of Avonmouth, Liverpool and Glasgow. It is interesting to note that the Federal Company's capital of half a million sterling is owned in equal proportions by eight companies, amongst which number are included the P. and O. Company and the firms of Messrs. Anderson & Co. and F. Green & Co., who are both interested in the Orient Line. The New Zealand Company thus obtains some powerful allies in addition to the other advantages I have enumerated.

Board of Trade Inquiries.

Two important inquiries have been concluded within the last few days. One of these was that concerning the loss of the small steamship *Eastern Counties*, which turned turtle and sank with loss of life in the month of October off the Bull Lightship. The point of the case seems to have been that it showed in these responsible great want of knowledge as to the elementary questions in regard to the stability of ships. In the first place, the vessel had, in the opinion of the Court, an excessive deckload, which caused her to be in an unstable condition when she sailed from the port of Yarmouth. Further than that, when the master saw that the vessel was in this condition he failed to take proper measures to remedy her excessive tenderness. His failure seems to have been due to the fact that he did not appreciate the danger of loose water, and of trying to remedy a list in an already tender ship by filling one of the lifeboats situated, of course, high above her water line with water. The other case was that of the steamship *Dunsby*. The hearing occupied the unprecedented period of twenty one days. Here a vessel insured for about double her actual value, as fixed by the finding of the Court, foundered in Cardigan Bay when on a voyage from Appledore to Liverpool for repairs. The composition of her crew was peculiar, there being but two men—one an uncertificated engineer and the other a fireman—in the engine-room complement, though the superintendent engineer, who was aboard, seems to have acted as "volunteer" in the engine-room department. The Court held that the excessive length of the trial was due in great part to the evasions and misrepresentations of certain of the witnesses. The master who held the Board of Trade certificate was suspended for twelve months, the managing owner, engineer and superintendent engineer were all ordered to contribute substantial sums towards the cost of the inquiry, the amounts payable being fixed at £1,500 in the case of the owner, £100 in the case of the engineer, and £50 in the case of the superintendent. The reasons for these punishments—for orders to pay costs amount to punishment in these cases—was that it was held that the vessel was not seaworthy when she left Appledore, that she was also undermanned, and that the master, engineer and superintendent-engineer shewed by their conduct "an absence of desire to save the ship." In point of fact, no attempt seems to have been made to find out the cause of the inflow of water into the ship nor the position of the leak, whilst no steps were taken to close the tunnel door nor the doors in the bulkheads. There is some talk of an appeal.

Surgeons at Sea.

The P. & O. Company has issued a notice that in future there will be a charge made to passengers for the services of the ship's surgeon, though the fee exacted will, being fixed by the management of the Company itself, be far below that which would be asked by a competent practitioner on land for service to persons in similar positions to those who usually travel in the various classes at sea. The move seems a perfectly reasonable one. Ships are now floating hotels of the most luxurious description, and no one expects the innkeeper, however high his charges, to provide gratuitous medical attendance for his guests. It will be interesting to see if this innovation be copied by other steamship companies. But the fact is that expenses are rising so rapidly owing to the increase of size and power of steamers and to the enhanced luxury demanded by the passenger that no source of revenue, however apparently small, can be neglected by the shipowner who means to hold his own in the strenuous competition of to-day.

A Well-earned Presentation

was made the other day to Captain Alfred Latelle of the Newhaven and Dieppe steamship *La France*. In the great gale at the beginning of November his vessel's steering gear was completely disabled at a most critical moment when he was just entering the port of Newhaven. In less capable hands the vessel's situation might easily have led to a great catastrophe. But the French shipmaster was equal to the occasion. Steering by the use of his twin screws he backed his vessel away into deep water where she had plenty of sea room, meanwhile signalling for

[illegible] which was rendered as soon as possible. In the result the vessel was safely berthed after some [illegible] hours' delay. In recognition of his seamanship and their gratitude the passengers subscribed for a piece of plate which was presented to the shipmaster early in January. The person entrusted to hand over the testimonial does not, however, seem, from the report in the "Times," to have been embarrassed with tact. For he [illegible] that King and he, being [illegible] at the sea, [illegible] to recognise seamanship in the people of other nations. Considering the seamanship of the Norwegian and British officers [illegible] and remembering the history of [illegible] opportunity at the great sea tragedy of the last two months, this speech was indeed unfortunate, and [illegible] the [illegible] we know that there are [illegible] to resent it. But it is [illegible] such as this that account for British unpopularity abroad [illegible] which always exists our regret and surprise, [illegible] notice these little contretemps at the time.

The Lost "Waratah."

A life buoy, said to bear the name of the t.s.s. *Waratah*, has been washed ashore on the coast of New Zealand. The incident brings back to mind a terrible and mysterious loss. But it really does little more. For there can be no certainty that this life buoy parted company with the ship after her foundering. It may even have been washed overboard when the vessel was in Southern seas. Further, even if it did go down with the ship and float to the surface as long a time has now elapsed from the time of the disaster there is nothing surprising in the fact that it was found where it was, for the Agulhas current would have carried it out into the Indian Ocean and it could easily have drifted to the place in which it was found. We cannot hope that real light on the final scene of that terrible disaster will ever now be found.

MARINE BOILER EXPLOSION.

REPORT No. 2087 issued by the Board of Trade deals with the explosion in the boiler of the steam yacht [illegible]. The explosion occurred on the 14th September last, shortly after the vessel had picked up her moorings off Strathlaw, Loch Striven, Argyleshire. The engineer, Joseph Fitz, was severely scalded that he died early on the following morning. The nut on the lower end of the screwed stays on the three central girders which supported the combustion chamber crown were stripped off, and the crown plate was turned over the ends of these stays and bulged about three inches. The steam escaped through the stayholes, by way of the furnace flue, to the combined stokehold and engine room. The explosion was undoubtedly caused by shortage of water in the boiler. The observations of the Engineer Surveyor in Chief:—In this case the combustion chamber crown plate collapsed, and being forced over the ends of some of the stays, steam escaped from the boiler through the stay holes and scalded the engineer in charge, who succumbed from the injuries he thus received. The explosion was due to the plate becoming overheated owing to the shortness of water in the boiler, arising from having put a stopper which had been fitted on the previous day by the engineer to close one of the main tubes which had failed, and it would seem that the unfortunate man was not aware of the dangerous condition of the boiler until it was too late to rectify the matter.

Institution of Naval Architects.—[illegible] will take place on Wednesday, March [illegible] and the [illegible] will be held at the House of the Royal Society of Arts, John Street, Adelphi, W.C. The chair will be taken by the President, Mr. Maurice Hill, Rear-Admiral R.N. [illegible] will be read on Wednesday, March [illegible] at the Royal Institution, Great Queen Street, Kingsway, W.C.

NAVAL MATTERS—PAST AND PROSPECTIVE.

(From our Own Correspondent.)

Portsmouth Dockyard.

WHEN Their Majesties the King and Queen arrive here [illegible] there will be an opportunity of having a glimpse of the Home Fleet, [illegible] with all the available battleships and armoured cruisers of the Third Division, are to be at Spithead on February 4th in [illegible] Mrs. Moore, the sister of Admiral Sir Arthur Moore, the Commander-in-Chief. It is [illegible] a private function, only the Commanders and [illegible] Admiral Superintendent are the principal [illegible] present. It is understood that the [illegible] than the *King George V.* and several [illegible] that she will carry [illegible] of 6-inch guns mounted behind armour as a defence against torpedo attack; and that she will be faster than the battleships [illegible]. The [illegible] Captain A. W. Cook and has relieved the *Hibernia* as flagship of the Rear-Admiral of the Second Battle Squadron of the Home Fleet. The *Orion* is the first ship completed with 13·5 inch guns. She was laid down on November [illegible] 1909, and is [illegible] between perpendiculars [illegible] feet 6 inches [illegible] tons displacement at 27 feet 6 inches draught. The *Orion* had a [illegible] trial trip on Sunday, January [illegible] in the Solent and [illegible] the Downs off the *Orion*. With great promptitude [illegible] were let go by those aboard the *Revenge*, and this checked her way. Tugs managed to pick her up [illegible] the *Orion*, and she was subsequently placed in dock. It was then seen that on the starboard quarter about 70 feet from the stern and just below the water line the plates were bucked in, forming a gap 12 feet long and triangular in shape, with the apex [illegible] inches in width at the top and extending to 12 inches at the lowest part. At the time she broke adrift the *Revenge* was moored in the upper part of the harbour, the *Orion* lying next, while farther along were several other vessels. Had not the prompt action taken to secure the *Revenge* been successful, serious damage might have been done to the [illegible] and would have [illegible] upon the other ships. Owing to the [illegible] to the harbour in most the greater [illegible] of the [illegible] and [illegible] which appears to recur at each spring tide, revised mooring [illegible] in the upper [illegible] mooring by attaching the ship [illegible] March 1st. [illegible] Admiralty.

Devonport Dockyard.

[illegible] on December we had a visit from Sir James [illegible], the Director of Dockyards and Dockyard Work, who [illegible] with Rear-Admiral Stokes, the Admiral Superintendent, and the heads of departments. Although [illegible] as to what took place, there is no [illegible] visit was in connection with the programme [illegible] coming financial year, which promises to be a [illegible] On January 25th, the New Ship No. 2, for which [illegible] is provided in the Estimates for the current [illegible] down, and there will be the new battleship [illegible] which was launched last November, to complete. So [illegible] we have a fair share of repair work, we ought to be fully employed. The battle-cruiser *Lion* has been carrying out [illegible] trials in a splendid manner. Her eight hours' full-power trial was run in very severe weather, but the performance of the machinery, both as regards boilers and turbines, was completely satisfactory. The mean power for the eight hours showed an excess over the contract rate of nearly 10 per cent., while the steam economy was most satisfactory. During the trials, coal only was used, and there is no doubt when the vessel is run with liquid fuel the results will be even more satisfactory, and the legend speed greatly exceeded. The vessel is said to have attained a mean speed of 29·7 knots and a maximum speed of 31·7 knots, but these high speeds were registered on the patent log, and are, of course, no certain guide. The *Lion* is under the command of Captain A. A. M. Duff, and there were present on the trials Mr. McKechnie, one of the directors of Messrs. Vickers, who constructed the machinery; Engineer Rear-Admiral G. Elbrow and Engineer-Commander J. Haves, representing the Commander-in-Chief at Devonport; Engineer-Captain W. Anstey, the Assistant-Engineer-in-Chief of the Fleet; Constructor W. Davis, representing the Director of Naval Construction; and Engineer-Commander W. James, the engineering manager of the yard. The chief engineering officer of the vessel is Engineer-Commander D. Green. The *Lion* has since completed her circle turning, steering, etc., trials, and is now being prepared for commissioning in the First Cruiser Squadron, in which she is to relieve the *Inflexible*. The trials of the battleship *Thunderer* were to begin at the end of January, the crew of the battleship *Illustrious*, of the local division of the Home Fleet, having been ordered to join the *Thunderer* at Dagenham on the morning of the 30th. The trials have, however, been postponed for a fortnight. Captain H. Oliver, who has been succeeded as Naval Assistant to the First Sea Lord by Captain De Bartolomé, took command of the *Thunderer* on January 1st. The battleship *Bellerophon* has completed her refit and has left to rejoin the Home Fleet. The cruiser *Dartmouth*, which was commissioned in October to replace the *Doris* in the Atlantic Fleet, has since then been detained here owing to turbine defects. She has now been put right and has left to join the Atlantic Fleet for exercises off the coast of Spain. Two outbreaks of fire have recently occurred in the oil fuel compartments of the battleship *Cæsar*, but both were fortunately extinguished by the ship's fire party without causing serious damage. The cause of the fires is unknown. It is stated that at one time the flames burst through the ammunition passages and the men awaited orders to flood the magazine, but this was not necessary. Commander A. Alington, who for the past eighteen months had been serving in the *Essex*, in the Fourth Cruiser Squadron, has succeeded Commander E. Henslowe in command of the *Indus*, the boy artificers' establishment.

Chatham Dockyard.

We had our first visit from the new First Lord, Mr. Winston Churchill, M.P., on January 16th and 17th, when the Lords of the Admiralty made their annual inspection of the yard and naval establishments. The Admiralty yacht *Enchantress* arrived on the 15th, and their Lordships on the following day, the inspection beginning after they had lunched on board the yacht. Dr. Macnamara, the Financial Secretary, and Sir J. Marshall, the Director of Dockyards, probably had the busiest time, receiving close on one hundred deputations. The usual dinner was given on board the yacht to the Admiral-Superintendent and the principal officials of the yard. The new cruiser *Chatham* was, of course, inspected. As anticipated last month, the Mayor of Chatham is interesting himself in this vessel, and is initiating a local subscription to purchase a piece of plate for presentation to the ship when she is completed and commissioned. Several vessels have recently come in for refit, including the new cruiser *Falmouth*, which is to have several defects made good; the battleship *King Edward VII.*, to undergo her annual refit; the scout *Foresight*, of the Nore Destroyer Flotilla; the submarine depot ship *Vulcan*, from Dundee; and the ocean-going destroyer *Mosquito*. The *Berwick*, of the Fourth Cruiser Squadron, was due here on January 13th, but she has been ordered to remain at Sheerness for the present. The battle-cruiser *Indomitable* is to have her refit completed by January 31st. The *Ghurka* has completed her refit and has proceeded to Harwich to rejoin the First Destroyer Flotilla. The *Scorpion* has also rejoined that flotilla, having had made good the damage she sustained in collision with a sailing ship in November. Submarine *D 7*, the first of two submarines of the "D" class built here, has been commissioned and has left to join Section II. Submarine Flotilla, at Portsmouth. The second vessel, *D 8*, has been carrying out her trials and will shortly be ready for commissioning. It has been announced that the annual dockyard sale is to take place on May 14th.

Sheerness Dockyard.

We continue to be fairly busy with repair work, several destroyers and submarines being in hand. Torpedo-boat No. 30, which had been here for ten weeks making good the damage received when she stranded on a submerged rock off Inchkeith Island, has resumed duties in the Nore Destroyer Flotilla. The *Doon* is to complete her refit by the end of January, when she will rejoin the same flotilla. Two submarines, *C 9* and *C 12*, came in on January 15th from Harwich for a refit. Moorings having been laid down at Harwich, which is in future to be the headquarters of the Nore Flotilla; the cruiser *Diamond* and a number of destroyers have left during the month for their new base. It has been arranged that pending the provision of a permanent mooring plant and staff for Rosyth, this yard will be responsible for the laying and maintenance of all moorings at Rosyth and other ports in Scotland within the limits of the Nore Command. The work will be under the superintendence of the King's Harbourmaster at Rosyth. The battleship *Hibernia*, which has been relieved in the Second Division of the Home Fleet by the new battleship *Orion*, is to join the Nore Division of the Home Fleet in place of the *Bulwark*, which went to Chatham in October for a refit. It is interesting to note that the battleship squadron of the Nore Division, when joined by the *Hibernia*, will consist of four vessels of the "King Edward VII." class. The new floating-dock constructed by Messrs. Swan, Hunter and Wigham Richardson, of Wallsend-on-Tyne, has now been launched, and, according to a recent official announcement, should be in position in Saltpan Reach by the end of the financial year. The dock has a lifting capacity of 32,000 tons. Engineer Rear-Admiral E. Little, who for eighteen months had been on the staff of the Commander-in-Chief at the Nore, retired on reaching the age of sixty, and was succeeded by Engineer Rear-Admiral W. Sharp. Admiral Little served at the Admiralty in connection with water-tube boilers, and at different times he was chief engineer at Simon's Town and principal engineering officer in the Mediterranean Fleet, Channel Fleet and Second Division of the Home Fleet. Among several engineer-captains who have recently retired through age is Engineer-Captain E. Cornish, who was on general staff duties at the Nore. Reference was made last month to the illness of our late Captain-Superintendent, Captain H. Torlesse. The news of his death was received with deep regret. For several weeks before his retirement on December 1st, he had been unable to attend to his duties, but the following day there was a slight improvement, and he was removed to his home at Southsea, where he died on the 26th.

Pembroke Dockyard.

The Admiralty have recognised that the programme of work allotted to this yard for the present financial year is inadequate to afford employment to all the men during the remainder of the year, and they therefore decided to send the scout *Attentive* here to be refitted in order to supplement our work. The vessel, which is attached to the Second Destroyer Flotilla, arrived on January 11th. We are not making such rapid progress as we should wish with our new vessel, but that is owing to the material not coming to hand

with sufficient rapidity. Fairly satisfactory progress is, however, being made. The framework to the height of the lower deck has been carried from stem to stern, and the lower deck beams are almost all in place, while the plating of the lower deck is well advanced. The framing of both sides above the lower deck has been taken to the upper deck over the central part, and a large number of the beams of the upper and forecastle decks are in position. The stern post has been erected and the stem put up. The cruiser *Amphion* is making good progress. She has been allocated to Portsmouth for manning purposes. The cruiser *[illegible]* was commissioned as arranged and has left us for duty with the Second Destroyer Flotilla. The refit of the destroyer *Lowest* has been completed, and by the end of January she should have left us. The full-power trial of the destroyer *Quail* is arranged to take place on January 26th. The refits of both vessels were taken in hand early in September; so they will have been completed under five months, which has been the time hitherto occupied here. The completion of the *Lowest* enabled the destroyer *[illegible]* to be taken in hand. Another destroyer, the *[illegible]*, has arrived for a re-tubing refit.

H M Protected Cruiser *Dartmouth*.

H.M. CRUISER "DARTMOUTH."

THE *Dartmouth* and her sisters, *Weymouth*, *Falmouth* and *Yarmouth*, represent an improved "Bristol" or "Town" class of cruiser, and are now passing into service, having been built under the 1909-10 estimates.

They differ from their predecessors in having a uniform armament of eight 6-in. guns, instead of a mixed one of two 6-in. and ten 4-in., and an extreme beam of 48½ feet as against 47 feet, with a consequent rise of displacement from 4,820 to 5,250 tons.

In outward appearance they greatly resemble the earlier ships, but one misses the formidable-looking array of 4-in. guns along the broadside, while as the first broadside pair of 6-in. guns are mounted on the forecastle, the hull side is not cut away to allow for their axial fire. The ship thus carries three 6-in. guns on the forecastle, another pair amidships at the somewhat lower level, and three more in the stern, arranged as per plan. Along the top side, between the after funnel and mast, are the eight quick-firing guns, four on each side. Another minor detail which serves to effectually distinguish these ships from the earlier "Towns" is the height of their funnels, which is considerably greater; the tops come up to about mid-way between the chart-house and control station on the mast.

The *Dartmouth's* dimensions are:—Length 450 feet, beam 48½ feet, and draught 15½ feet, and driven by 22,000 H.P., her designed speed is 24½-25 knots, the machinery being Parsons turbines. On the eight hours' trial, however, 24·97 knots were reached with an expenditure of 19,028 H.P. The mean for the six runs over the measured Skelmorlie mile was 25·9 knots with 23,550 H.P., in bad weather, the fuel consumption working out at 1·48 lbs. per shaft H.P. per hour. Although of greater displacement, the class appears to be somewhat faster than the "Bristols," the *Falmouth* having reached 27·01 knots, as against 26·84 of the best of her class, the *Bristol*.

The *Dartmouth* was laid down at Barrow on February 19th, 1910, and took the water on February 14th in the following year. The *Falmouth* was commenced by Messrs. Beardmore & Co., Glasgow, on February 21st, 1910, and launched on September 20th in the same year; the *Weymouth* reached her launching weight at Elswick between January [illegible]th and November 18th, 1910, and the *Yarmouth* (London and Glasgow Shipbuilding Co., Glasgow) between

January 27th and April 12th, 1910. The total costs of the ships were as follows:—

	Total Cost.	Per Ton.	Builders	Total months building
Dartmouth	£334,847	£63·7	Vickers	19·75
Falmouth	£339,274	£64·6	Beardmore	19·25
Weymouth	£341,862	£65·1	Elswick	19·5
Yarmouth	£354,405	£67·5	L. & G. S. Co	19·75

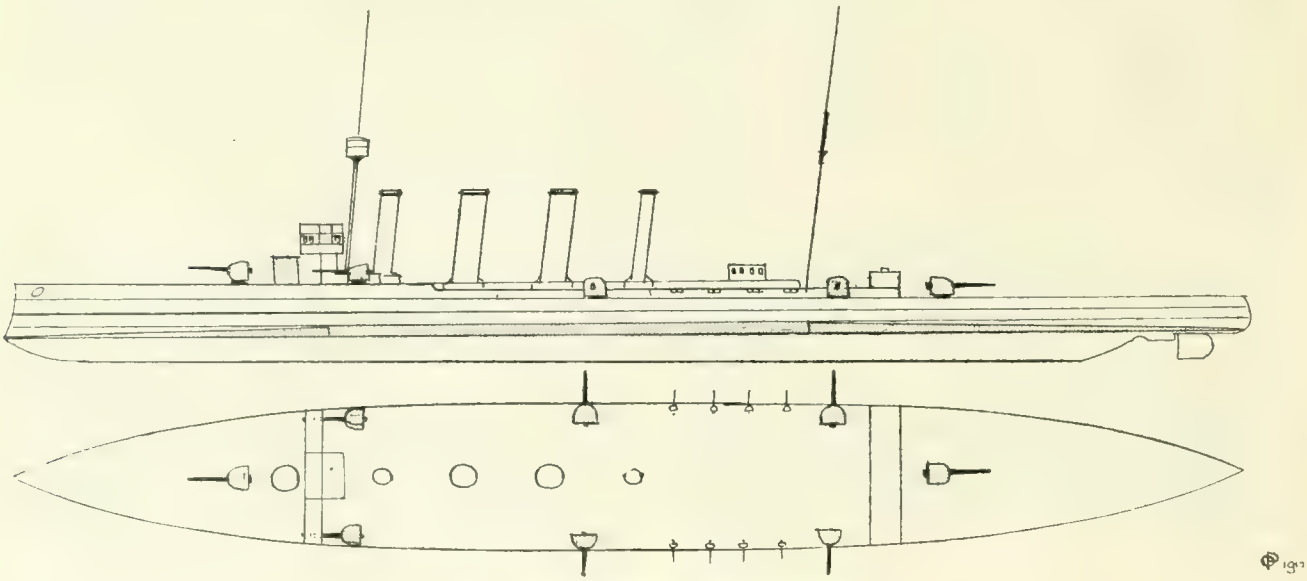
As the cheapest of the "Bristols" was the Vickers-built *Liverpool*, of 4,820 tons, which cost £344,871 (£71·5 per ton), we have an instance of obtaining a far finer ship for a greatly-reduced price per ton.

Along with the armament, the coal supply has been increased from 800 to 1,000 tons, and the complement from 376 to 380 men.

must be borne in mind that only two of these small cruisers accompany each of our Fleets; the crying need for scouts—Nelson's frigates—has disappeared with the advent of wireless telegraphy, which is carried on torpedo-craft, thus converting them into proficient scouts, which can be risked without their loss being much felt. What, then, is the utility of these "Town" cruisers apart from "fetch and carry" fleet duties, and mothering torpedo craft, scouting, etc.? Commerce protection is not likely to requisition a large number of war-vessels, as our probable enemies have no bases from which marauding cruisers could operate, and if one or two did slip beyond the cordons which would seal the entrances to the North

TABLE OF CONTEMPORARY TYPES

Nation	Type.	No. in Class.	Displacement in Tons.	Designed I.H.P.	Designed Speed.	Armament.	Torpedo Tubes.	Coal in Tons.
England	Dartmouth	4	5,250	22,000	25	Eight 6-in., eight smaller, two machine	3	750/1000
Japan	Yasaku	3	5,000	22,500	26	Six 6-in., four 3-in., four machine	2	600/850
Germany ..	Augsburg	4	4,281	20,000	25·5	Twelve 4·1-in., twelve smaller	2	400/900
Italy	Quarto	3	3,435	22,500	26	Six 4·7-in., six 3-in	2	450/800
Austria ...	Ad. Spaun	1	3,500	20,000	26	Seven 3·9-in., two smaller	3	450/850



Plan of the Protected Cruiser *Dartmouth*

The ships which have followed the "Dartmouth" class on the stocks are known as the "Dublin" class, and displace 5,400 tons. There are six of them building—three for the British and three for the Australian Navy—and, apart from a few structural improvements, they are practically sisters to the ships under discussion. The type to follow them will probably be of a completely different design, inasmuch as we have now quite as many of these small cruisers as we want, and their war-*rôle* is likely to be somewhat limited. When dealing with the "Town" class we prophesied the evolution of a much larger ship mounting 9·2-in. guns, as the necessity will arise for providing ships able to deal out punishment to battle-cruisers, from which our commerce is more likely to suffer than from these 5,400 vessels. It

Sea, they would have but a limited range of action. To run them down we have a long list of armoured cruisers—"Towns" would not be employed.

We can therefore say with some degree of assurance that, after the next estimates, no provision will be made for ships of this type of less than 9,000-10,000 tons, and that these new ships will carry 9·2-in. guns, and in company will be capable of inflicting such damage upon battle-cruisers—which will be the biggest thorn in our flesh—that their subsequent capture should be easy.

Until the host of small ships we have now are scrapped there will be no further call for an increase in their numbers; when a need for cruisers is felt, something of the type outlined will be forthcoming.

Sir William E. Smith K.C.B.,

The Director of Naval Construction.

THE NEW DIRECTOR OF NAVAL CONSTRUCTION.

THOSE who have followed the career of Sir Wm. E. Smith, K.C.B. (until the other day Superintendent of Construction Accounts and Contract Work at the Admiralty) will feel that the new appointment to the Directorship of Naval Construction has been indeed a wise one. Sir William is eminently fitted for promotion to this responsible post. But when we have said this we have by no means stated the only ground on which this appointment will be approved. It has been too often the practice to appoint to this post outsiders who, though undoubtedly capable men, have not been continuously in the service of the Crown. On this occasion no one can deny that the person chosen for the position is entirely a service man, for he has been in it all his life, having entered it no less than fifty-one years ago, when, as a boy of eleven, he entered the rope-house at Portsmouth Dockyard. After a time there he became a shipwright apprentice, serving one year at Woolwich (then a dockyard) and three years at Portsmouth. In 1869 he joined the School of Naval Architecture, which was then still situated at South Kensington, not having at that time been removed to Greenwich. At the School he greatly distinguished himself, taking a first-class certificate, and thereupon being appointed to the Admiralty staff. This was in the year 1873, and he was at once employed on the designs of the battleships of the later 'seventies. His lectures on "Armour," which were delivered during his tenure of the Instructorship in Naval Architecture at Greenwich College—a post which he held in succession to Sir William White—were a valuable contribution to the controversy on the comparative merits of complete and partial armour belts, and were issued by the Admiralty as a guide to all officers throughout the service. In 1887 he was appointed Inspector of Contract Work, a post which gave him

an insight into the methods prevailing outside the Admiralty establishments, and thus tended to complete and round off his practical knowledge, and taught him much as to the shipbuilding resources of the country as a whole, and prepared him for the post of Superintendent of Construction Accounts and Contract Work, which he now vacates, and to which he was appointed in the year 1902. Whilst occupying this post he was enabled to use his personal influence towards maintaining and strengthening the good understanding between the Admiralty and its contractors. During the period in which he was a chief constructor, prior to his appointment in 1902, he was at work on the designs of the vessels of the Naval Defence Act, and on those of the vessels following them. He thus has considerable experience of the class of work which he has now been called upon to direct, and for which he will now assume the responsibility.

His appointment will be popular with the shipbuilding world generally, as he has won the regard of those with whom he has been brought in contact during his tenure of his positions in connection with outside work, and it will also be a satisfaction to the Royal Corps of Naval Constructors, as it will show them that they are eligible, not only theoretically, but practically, for the highest post in the Admiralty with which their profession is concerned. Sir William, who is now in his sixty-second year, was made a C.B. in 1903, and a knight in 1911.

MAN'S HUMANITY TO MAN.—One of the pleasing features to be noted during the entrance into the New Year is the spontaneous recognition by many firms of the services rendered by their employees during the year that has past and gone. Prosperity from the labour of the brain should be extended to the whole body in some degree; the hand and the foot contribute to the upholding of the head, and it seems fitting that the directing power should bestow some thought on the extremities. The victorious chief in the days of old shared with his followers the fruits of his victory, and no doubt they appreciated the gifts more than the wages of the hireling. The freewill offering gives pleasure to the giver as well as to the receiver, and from the expressions heard in connection with the cases which have come under observation, the spontaneous recognition has been productive not only of pleasure to both sides, but will be an incentive to raise the ideal of duty into the privilege of serving faithfully and generously; elevating both giver and receiver

R.N.R. WARRANT ENGINEERS AND R.N.R. ENGINE ROOM ARTIFICERS.—Whether the appointments by promotion from a lower to a higher grade in the Engine Department of the Navy referred to in the memorandum published in our last issue is due to the scarcity of men, the exigencies of the service, or in recognition of a policy, it appears on the setting forth to be detrimental to the best interests of the Department. It certainly seems to be a retrograde step, to take a stoker, give him a slight brush up, and place him in charge over those who have undergone a special training, as described in the memorandum, which is being largely discussed in engineering circles, and information on the subject is being looked for. What is detrimental to the engineering department cannot but be detrimental to the whole ship, and as it is by no means clear that the new system of training engineers for the Navy is likely to prove more efficient than the former system—many engineers indeed believe that it will prove the reverse—it seems, on the face of the memorandum published on behalf of the artificers, many of whom are expert engineers, that an unfortunate issue has been raised at an unfortunate time. The explanation or correction of what underlies the proposed changes is awaited for expectantly

INTERNAL COMBUSTION MARINE MOTORS.

(Continued from page 196.)

All marine motors are water jacketed. The circulating water is driven through the jacket or jackets by means of a pump which may be a drum pump, a gear-wheel pump or an ordinary plunger pump. The methods of driving the pumps are numerous. In a two-stroke motor the crank shaft has to be used and the drum and gear-wheel type of pumps are driven by chains or gearing off the crank shaft, the plunger pump by means of an eccentric on the crank shaft. With four-stroke motors the pumps are driven off the crank shaft or the cam shaft, as the designer thinks best. Marine engineers are too familiar with pumps to require detailed information regarding the repair and upkeep of pumps. It is well to see that the pumps are in good order, otherwise cylinders and pistons become overheated, causing piston rings to fire and cut up the cylinder. On the other hand, it is not desirable to put too much water round the jackets, as the colder the cylinder the lower the efficiency of the motor. The makers know best what amount of water their motors require, and it is usually best to send as much water through the jacket as the pumps will throw. A scored cylinder costs more to repair than can be saved in fuel by running the motor with a higher temperature of water in the jacket.

The lubrication of the motor is another point which should offer no difficulty to anyone who has had charge of machinery. The maker usually advises certain oils and greases for the various parts and gives the number of drops each part should have. "Splash" and "forced" lubrication are used for the internal parts by different makers, and latterly some advocate

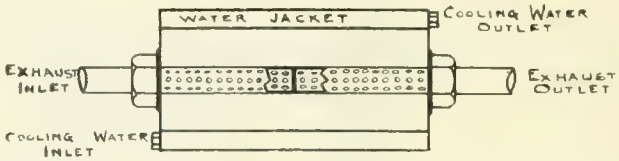


Fig. 4

mixing the lubricating oil with the petrol and allowing it to find its own way to where the oil is required. The main bearings are generally fitted with screw-down grease cups.

Silencers or mufflers are fitted to the exhaust pipe to deaden the noise of the exhaust. All silencers work on the principle of breaking up and expanding the stream of hot gases or by cooling it or by a combination of both methods. A very common form of silencer is that illustrated in Fig. 4. In this type the exhaust pipe runs through the silencer and has a plate stopping up the passage in the middle of the silencer. The exhaust pipe is full of holes, inside the silencer, on both sides of the diaphragm. The silencer is water jacketed. The action is, the exhaust passing along the exhaust pipe meets the diaphragm and is compelled to pass through the small holes in the circumference of the internal pipe into the body of the silencer, where the gases expand and, owing to the water jacket, are cooled and, to a certain degree, reduced thereby in volume; from the expansion chamber the gases pass through another set of holes in the circumference of the internal pipe which leads to the atmosphere. The cooling water enters the jacket at the lowest point and escapes at the highest point. Some silencers are simply a cylindrical chamber having a number of baffle plates in it, the holes in the baffle plates being about $\frac{1}{16}$ in. diameter. The only limit to the amount of silence obtained is the back pressure which is set up. In other forms of silencers the exhaust gases are cooled by passing through a spray of water from the cylinder jacket, and after the mixture of exhaust and steam has expanded in an expansion chamber they are discharged to the atmosphere. The water may escape by a small separate pipe or by the exhaust pipe.

Fuel tanks should be of welded steel galvanized or of copper. There must be a small hole in the filling-pipe cap to admit air. On the bottom of the tank there should be a "sump," something after the manner shown in Fig. 5. The object of this is to catch any water which may find its way into the fuel. Water being heavier falls to the bottom,

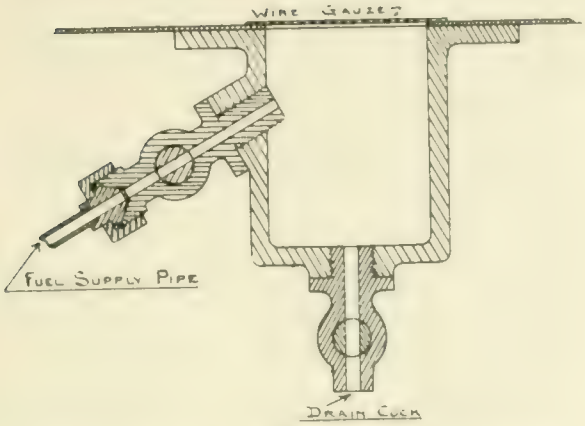


Fig. 5.

where it collects. The fuel to the engine is drawn off near the top of the "sump" where it should be quite free from water. The water may be drained off by means of the drain cock. All fuel should be strained before entering the fuel tank, but as an additional precaution it is a good plan to have a piece of wire gauze fixed over the "sump" so that there is less chance of dirt entering the fuel pipe and causing an obstruction.

PIPES AND CONNECTIONS. The fuel pipe should be of copper and there should be a shut-off cock or valve on the tank and another close to the carburettor. The circulating water inlet should also be of copper. There should be a wire netting of fine mesh to strain the water before it enters the pump. It is an advantage to have the strainer in an accessible position so that it may be cleaned from time to time. There should be a shut-off valve or cock close to the skin of the boat. The rest of the cooling water pipes are generally made of copper, that is from the pump to the jacket, thence to the silencer and overboard. The exhaust pipe is made of wrought iron or steel pipes and in special cases of copper.

Having considered the fuel tank of the motor the next point will be the fuel. In marine motors the fuels most used are petrol, or gasolene, paraffin or petroleum, crude oil, suction gas. Dealing first with petrol, which is the easiest fuel to work with, it is a clear white liquid which evaporates readily in the atmosphere at ordinary temperatures, giving up a gas which, when mixed with the proper proportion of air and this proportion has very wide limits, is highly inflammable. Now if petrol were a perfectly homogeneous spirit all that would be necessary to do to obtain an explosive mixture would be to bubble air through a small tank and the resulting gas could be utilized in the cylinder of the motor

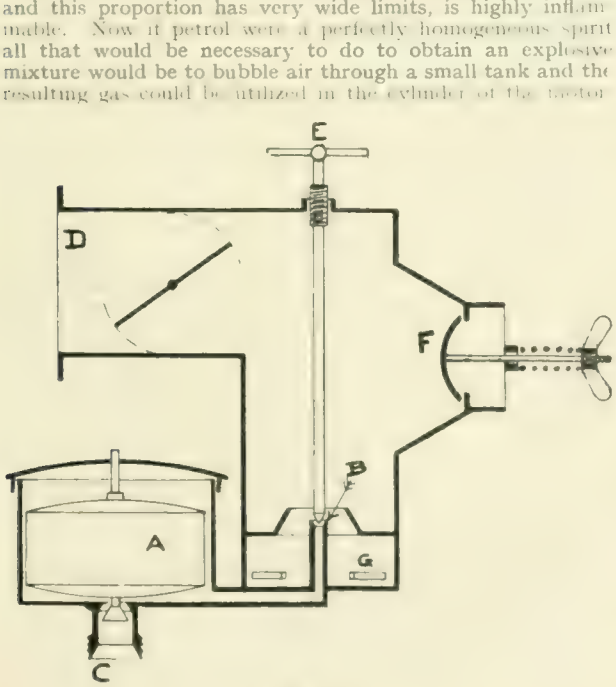


Fig. 6.

or a wick screen could be kept moist with petrol and air passed through, or some similar simple method of carburation could be adopted. Unfortunately petrol is composed of several spirits, some of which evaporate more readily than others, so that if any of the foregoing methods are used the lighter spirits are evaporated first and in larger quantities and latterly a spirit is left which is very hard to evaporate at all. The preceding methods are called "selective" carburation, as the air selects the spirits which it can evaporate most readily.

To overcome the trouble carburettors are made generally on the jet principle. In this style the air is drawn through a passage and as it rushes along a jet of petrol is spurted into the air. The petrol, being in a finely divided state, is instantly and completely vaporized. The general action of a carburettor will be gathered from the diagram Fig. 6.

A is the float which is contained in a chamber called the float chamber. There is a rod, passing through the centre of the float, the top of which comes through the cap of the float chamber, and on the lower end is a valve. The float is arranged on the rod in such a way that the petrol level in the float chamber is just in line with the top of the jet B, which is in communication with the float chamber. C is the inlet pipe from the fuel tank to the carburettor. D is the outlet to the cylinder and is provided with a throttle valve. E is a small rod which screws through the cover of the carburetter. It is pointed so as to throw off the petrol, and when screwed

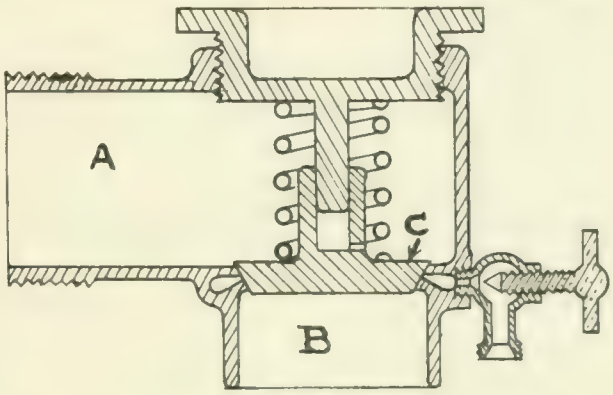


Fig. 7.

down tight completely shuts off the petrol supply. F is called the extra air admission valve and has a spring to keep it on its seat. The tension on the spring may be varied by means of the thumb nut. Round the bottom of the carburetter are some small holes G.

The action is as follows. When the motor is turned round slowly by hand a partial vacuum is formed in the outlet pipe, air is drawn in through the small holes G, but as they are restricted in area the pressure in the carburettor is below that of the atmosphere, the pressure of the atmosphere drives the petrol out of the jet B. This jet of petrol is sprayed out by the rod E and the fine spray is instantly vaporized by the incoming air from G. This gives a rich mixture for starting the engine, and as the speed of the motor increases the "suck" becomes stronger. This causes the extra air admission valve F to lift off its seat. The effect of this is two fold. First it dilutes the mixture of air and petrol, the air, of course, having entered at G. Secondly, by admitting the air above the jet more air will enter than at G, as the suck of the engine will be stronger nearer to the engine, this weakens the vacuum at the jet and consequently there is not so much petrol driven through the jet.

There is one other simple carburettor sometimes fitted on cheap two-stroke motors, Fig. 7.

A is the outlet to the crank case. B is the air inlet. C a conical metal valve held on its seat by a spring which may be locked to the proper amount by the screwed cap. Round the face of the valve seat is a groove which is in communication with the fuel tank. The inflow of petrol is regulated by a small screw-down valve. When the suction of the motor lifts the valve off its seat the petrol overflows the groove in the valve seat and caught by the inrush of air is vaporized.

(To be continued.)

AUXILIARY MACHINERY FOR INTERNAL COMBUSTION ENGINED VESSELS.

THE writer had the honour last session of submitting a paper to the Institute on "Internal Combustion Engines for Marine Use." In that paper a passing reference was made to the question of the manner of operating the auxiliary machinery, and it is proposed in this short paper to go more fully into this important question.

The past year has seen several important developments in marine oil engines of considerable power. All the larger and more important work has been designed by our competitors on the other side of the German Ocean. British firms appear to be sitting on the fence waiting to see how these experiments will turn out. It is to be hoped they will not sit there too long, and that when they do get down on the other side they will profit by the experience of their rivals and be able to go one better.

The auxiliary machinery on board a modern vessel is of such varied character and has to fulfil so many different conditions, that the problem of applying a suitable motive power is of some difficulty. It is of course desirable, if not necessary, that the same motive power should be used throughout the ship.

In the case of steam, with its great flexibility, very few difficulties are met in adapting it to drive the various types of machinery, or perhaps it would be more correct to say that any difficulties which arose in the past have been overcome long since.

It will be useful at this stage to give a list of all the auxiliary machinery required for, say, a moderate sized liner, carrying passengers.

1. Starting Engine.
2. Jacket Water Circulation Pump.
3. Oil Service Pumps where oil fuel is used.
4. Gas Cooling Pumps where producer gas is used.
5. Gas Scrubbing Pumps or gear (if necessary).
6. Producer Water Pump.
7. Bilge Pumps.
8. Ballast Pumps.
9. Sanitary Pumps.
10. Fire Pumps.
11. Hydraulic Pumps for watertight doors.
12. Fresh Water Pumps.
13. Electric Light Dynamos.
14. Steering Engine.
15. Deck Winches and Hoists.
16. Windlass.
17. Ventilating Fans.
18. Refrigerating Engine.
19. Syren and Whistle.
20. Fresh Water Distiller.

In addition to the above, a certain amount of heat is required for heating and cooking purposes, and also a certain amount of power for small labour-saving machinery.

We will first consider, as seems most natural, the starting engine, and it will be taken for granted that the main engines will be coupled direct to the propeller shafting without the intervention of clutches of any kind, mechanical, electric or hydraulic. Recent practice appears to favour this direct coupling for engines of any but the smallest size. Some type of clutch is useful for motor boats and other small craft to allow of hand starting.

There are two methods of applying a starting force to the crank shaft, the first being to utilise the power cylinders themselves, air or gas under pressure being distributed by the ordinary or special valves. In the second method the starting engine may be coupled to the engine shafting, mechanically, hydraulically or electrically during the manœuvring periods. The first system is most in favour at the present time.

A great many complicated contrivances have been designed to make the four-stroke engine to reverse and to start in either direction, but as the four-stroke engine for marine purposes is dying a natural death, there is no need to go further into these schemes. In the case of two-stroke engines the problem is simplified, as the outlet of the starting air from the cylinder takes place through the exhaust ports, and only the air inlet has to be provided for.

It is usual to work the air inlet valves from a cam shaft, with one set of cams arranged for ahead and another set for astern gear, the cam shaft being moved longitudinally to bring either set of cams to operate the valve spindles. This arrangement involves lifting the valve spindles or lowering the cam shaft before it is moved longitudinally. The arrangement adopted by the M.A.N. in their Diesel engines is preferable in that they use two starting valves to each cylinder, one for ahead and the other for astern. The cam shaft has two sets of cams, either of which is made to operate the valves by the insertion of a finger-piece between the cam and the valve spindle. This system involves two starting valves in the cylinder head in addition to the inlet valve, thus adding to the risk of leakage, and it must always be remembered that leaky valves in a Diesel engine mean disablement.

There are, generally speaking, many disadvantages in using the power cylinder as a starting cylinder, as while it is employed in starting it cannot undertake its normal functions. In addition to this, in two-stroke engines the exhaust ports open at about 85% of the stroke, so that the last 15% of the stroke is not available for starting.

In the system patented by the writer the bottom end of the power cylinder is closed and used as a scavenging and cushioning cylinder. The starting air is admitted to this bottom end of the cylinder, thus leaving the top end of the cylinder free to take up its normal functions immediately the engines are started up.

The second system of starting has not been used up to the present. So far as the writer is aware, it is a development of the system as used for starting up the engines of motor cars and motor boats, with the difference that engine or other power is used instead of hand power. The starting motor would be geared by chain or spur gearing to a friction clutch on the main engine shaft, this clutch being in gear only when manœuvring. The starting motor would be reversing and able to start from any position. It might be worked:—(1) Pneumatically. (2) Hydraulically. (3) Electrically.

*Contributed to the Institute of Marine Engineers by Mr W. R. Cummins (member), and read before the Institute on January 15th, 1912.

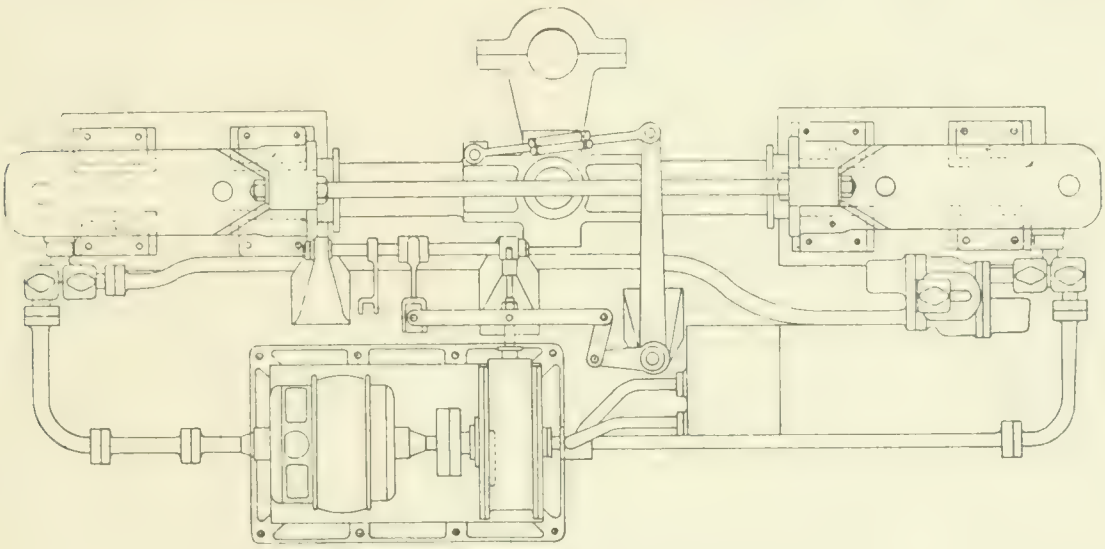
Passing on to the various pumps as given in the list of auxiliaries, it will be noticed that with the exception of the hydraulic pumps for the watertight doors and the fire pumps, all deliver at a comparatively small head. For this duty electrically driven, direct coupled, single stage centrifugal pumps will be far and away the most efficient combination.

Centrifugal pumps have been greatly improved of late years as regards their hydraulic efficiency. Their extreme simplicity, freedom from breakdown and small up-keep cost make them an ideal pump for the various water-lifting and circulating duties required on board. It may be mentioned here that the electric motor and the centrifugal pump suit each other as regards speed, and that no damage can be done to the motor or the pump even if the discharge valve be closed when the pump is going full bore, and further no escape valves are required. Another point in the favour of the electrical drive is that the amount of current taken by the motor adjusts itself to the duty being done by the pump.

mechanical efficiency. This, combined with the leak past the control valve makes them rather extravagant in steam consumption. An easy solution of the problem would be to use compressed air in place of steam, thus utilizing the present standard engines.

It is a sign of the times that many engineering firms who make a speciality of ship's auxiliary machinery are now devoting their attention to electrical and hydraulic driving. Through the courtesy of Mr. B. P. Haigh the writer is enabled to describe an electrical-steering engine of his design. The experimental gear was made by Messrs. Brown Bros. & Co., the well-known Steering Gear experts.

The motor runs continuously in one direction only, and there is a magnetic clutch at each end of the armature spindle, the engagement of one clutch giving port helm and the engagement of the other, starboard helm. The motion of either clutch is transmitted through suitable gear to a worm-shaft having two worms engaging wheels so arranged that the worm thrusts balance one another. The



Arrangement of Steering Gear fitted in the Diesel-engined vessel *Jutlandia*.
Illustrated by courtesy of Messrs. John Hastie & Co., Greenock.

The hydraulic pumps for the watertight doors might quite easily be driven by electric motor and gearing, or on the other hand would work just as well with compressed air as with steam. The fire pumps could be of the centrifugal multi-stage type, driven direct by electric motor. These multi-stage pumps have been developed in recent years by continental makers and are highly efficient.

Coming to the ventilating fans, of which a large number are required in the passenger accommodation, besides those in the machinery space, the electric drive is also in this case the most economical and suitable in every respect.

So far it has been easy going, and we now come to the steering engine, which presents a knotty problem. The present-day steam steering engine, the result of many years' experience, is a very reliable piece of machinery, and deals successfully with the heavy and variable stresses which come on the gear in a seaway. They are, however, not economical machines, and the friction of the usual slow pitch worm added to that of the thrust collars gives a low

worm wheel shafts carry pinions which engage with a quadrant rack connected to the rudder head in the usual manner by two connecting rods.

One of the chief points to be guarded against in electrical drives is that of overloading the motor.

If the steam engine of a steam steering gear were to get out of control and put the rudder up against the stops, or if a heavy sea struck the rudder, the engine would just pull up, no damage would be done, and the engine would start up again when the excessive load was removed. In the case of a motor, if it were pulled up dead it would burn out if no overload cut out were provided. In Mr. Haigh's gear any ordinary excess load would be eased by the slipping of the clutch, and any extraordinary excess current is arranged to break the circuit of the magnetic clutch, the circuit being again completed when the excessive load is removed.

Messrs. Clarke, Chapman & Co., of Gateshead, manufacture another type of electric steering gear, of which the writer is enabled by their courtesy to give the following particulars. The motor is of the revers-

ing type, and runs in one direction for port helm and in the other for starboard helm. The steering wheel works the control gear starting the motor, and the usual "hunting" gear stops the motor when the helm has answered the movement of the steering wheel. On this gear an overload cut out will be required to deal with excessive rudder resistance, which will entail the stoppage of the motor until the cut out is put in again.

Messrs. Brown Bros. & Co. are now perfecting a combined electric and hydraulic steering gear. The electric motor runs continuously and operates two crankshafts, which in their turn work ram pumps which discharge into hydraulic cylinders controlling the position of the tiller. The novelty of the gear consists in the arrangement by which the two crank shafts, although always coupled together, may be put into different phase with one another. By this means the ram pumps worked by the crank shaft may work one against the other, each pump on its suction stroke taking its neighbour's discharge, in which case no pumping action takes place. The phase of the crank shafts may also be arranged that the ram pumps assist each other, each contributing its full output, in which case the pumping action is at its maximum. Any intermediate output can be obtained by regulating the phase of the crank shafts.

Another combined electric and hydraulic gear is that invented by Dr. Hele Shaw and Mr. Leigh Martineau.

Through the courtesy of Messrs John Hastie & Co., of Greenock, I am able to illustrate this gear. It will be seen that the novelty in this gear consists in the variable output rotary pump effected by the movement of the pump case. Not only is the pump output varied by this movement, but the pump suction and discharge are also reversed so that the pump can be connected directly to the two hydraulic cylinders controlling the tiller without any intermediate mechanism.

The windlass presents somewhat similar difficulties as regards driving as the steering gear. It must have brute force, but does not require delicate control like the steering gear. Compressed air would be a satisfactory way of working it, as it would have all the flexibility and reliability of steam. Messrs. Clarke, Chapman & Co. also make an electrical windlass, and the writer is able to show a drawing of this gear, from which it will be seen that there is a worm drive, which will to a great extent protect the motor from undue loads, but in addition to this the usual overload cut out is fitted.

The cargo winches and cranes may be worked by compressed air or electrically. As an alternative the cargo could be worked by hydraulic power. The drawing shown represents a winch manufactured by Messrs. Clarke, Chapman & Co., the drive being through a worm, as in all their other electrically-driven machinery.

Hydraulically driven cargo hoists have many advantages, the chief being their noiselessness and small upkeep cost.

There is, of course, no difficulty about the electric light dynamo. It would be coupled direct to a high speed oil or gas engine, as the case might be. The pumps and ventilating fans would all be driven by this same dynamo. The Refrigerating Engine could be driven electrically or by compressed air, but in the case of a vessel carrying frozen cargoes, a separate plant would be required, the compressors being direct coupled to oil or gas engines.

The syren and whistle could be worked by compressed air, which would be cleaner and more convenient than steam, as there would be no trouble from condensation. The fresh-water distiller presents no difficulties, as there is plenty of waste heat available in the exhaust which would also supply any heating required in the passenger accommodation.

We have now gone through all the auxiliary machinery in detail, and it will have been seen that in either of the three systems of power transmission, *i.e.*, electricity, compressed air, or water under pressure, could be used to operate the auxiliary machinery, and we can now consider each system on its merits, taking into account the factors of: 1. Reliability. 2. Efficiency as a power transmission system. 3. Flexibility. 4. Adaptability for power storage.

At the same time it is important to keep in view the desirability of having one system only if at all possible. As electric light is one of the necessities of the case electricity will be dealt with first.

As regards reliability, the present-day electrical machinery as manufactured by responsible firms is quite reliable and suitable for use on board ship. This was not the case even a few years ago, when the machines were designed by electricians who were not engineers. In those days a motor of quite excellent design electrically would be alluded to somewhat disrespectfully as a fortuitous concourse of copper wire, sealing wax and string.

(To be continued.)

MARINE MOTOR NOTES.

It is satisfactory to observe that British makers have been securing many of the orders which we recently referred to as under consideration for motors and motor-boats. Messrs. Brooke, towards the close of December, were fortunate in receiving the order from the Greek Government for six sets of motors with the necessary fittings and appliances for revenue cutters, including lighting plants and searchlights. Messrs. Thornycroft's new marine motor catalogue gives illustrations of various types of boats they have fitted—the motor-cruising launch; the auxiliary yacht; the fire-float; the racing boat *Miranda IV.*, which attained a speed of 35·58 knots per hour; cargo-barge; the pleasure-launch *Foguete*, 40 ft. by 8 ft. by 15 in. draught, with a speed of 11 knots, fitted with a 45 B.H.P. motor. The different types of motors are also illustrated and described, with tables giving the standard sizes made. Improvements due to careful testing and experimental work have been made from time to time in the details and introduced into the standard types; the B.H.P. for each size is given for the class of fuel it is intended to use, and to ensure the best results it should be specified whether paraffin or petrol is to be used. The fuel consumption is given as ·65 pints per B.H.P. per hour, and guaranteed not to exceed ·9 pints her B.H.P. on brake test. The lubricating oil is about ·06 pint per B.H.P. per hour on full power. The Admiralty launch, delivered by Messrs. Thornycroft at Chatham, is fitted with a four-cylinder Diesel engine. The launch is 60 ft. by 10 ft. by 21 in. draught, and the speed fully 10 knots with the engine developing about 100 H.P. The coastal cargo-vessel *Progress*, about 110 ft. long, fitted with two Bolinders crude-oil engines and which were shipped to Siam, has been equipped with the machinery and tested on trial, and attained a speed of about 8 knots. The new oil-engined vessel for Messrs. Nobel Bros. has commenced her service in Russian waters, and is another of the many oil-engined vessels doing duty in the Caspian and adjacent waters. The speed of the new vessel, which is about 270 ft. long and 2,000 tons, is nearly 11 knots steady with 1,000 H.P. developed by two sets of engines, each with four cylinders. It is reported that the

Danish sailing pilot boats are to be fitted with motors or, possibly new boats ordered to replace them. On the Clyde there have been several orders recently booked and others executed. Messrs. Meclam & Co. referred to last month, have delivered one steel launch for Uganda and one for Calabar.

The steady progress made by oil engined vessels for coasting traffic is becoming more manifest and several firms have devoted their special attention to meet the growing demand; this is not confined to one district as we find it in the west and east of Scotland, on the canal banks and in the South of England. Messrs. Beardmore have developed the crude oil engine to an extent which has given confidence in its future. It is a vertical two cycle single acting, comparatively slow running engine, the design aiming at simplicity, strength and reliability to keep in view the desiderata of the marine engine. In the cycle of operations the upward stroke draws air into the crank case through a valve meantime the air already in the cylinder is under compression. At the end of the stroke the crude oil is then injected through a nozzle and strikes the walls of the heated combustion chamber; it is thus vaporized and the explosion stroke follows. The air in the crank chamber is now being compressed and as the piston descends it uncovers the exhaust port to allow the residue to escape from the cylinder. A little later in the stroke the piston uncovers the air inlet and the air from the crank chamber acts as a scourer to clean the cylinder for the next stroke; a portion of the air left on the closing of the inlet is compressed by the piston on moving upward and this completes the cycle of operations. The initial heating of the combustion chamber is by means of a blow lamp which is applied for a few minutes. Compressed air is admitted from special storage tanks through automatic valves fitted on the engine. These valves are put out of action when the engine is started and the lamp laid aside. An efficient governor is fitted for the regulation of the revolutions which can be controlled at will when underway. The two coasters *Fawn* and *Harkaway*, fitted with oil engines for Messrs. Crouchers, Ltd., Isle of Wight, are about to be added to by a larger vessel similarly fitted; this indicates good results from what was more or less experimental tests. It may be pointed out that many years ago firms on the Continent of Europe were satisfied that the oil engine is economical and reliable for marine purposes, notably well-known Russian firms, but in these cases the vessels were on the borders of the oil fields and were really engaged in the carriage of oil. It seems fitting that this coaster should develop in the land of plenty. Sweden has attained a high place for the industry, while Denmark, France, Germany and Holland have also made names for themselves; Britain, although lagging behind in the midst of her coal fields is now forging ahead. The subject of auxiliary machinery for oil engined vessels is constructed at the Institute of Marine Engineers, on January 15th, is of considerable importance and the adjourned discussion to be held on February 5th ought to prove highly interesting and beneficial.

The encroaching demands of labour tend to economies in machinery and as forecasted in former notes, the *Leda* is about to be followed by a tow-boat for the Lakes fitted with oil engines. The yacht *Mara* is coasting around, having left the Clyde, calling at Liverpool and Dublin on the way south proving the reliability and flexibility of the oil engine, so that Messrs. Beardmore have not only received congratulations on its success, but fresh orders.

REFRIGERATING AND COMPRESSED MACHINERY.—This is the title of an illustrated catalogue recently issued by Messrs. Seagers, Limited, engineers, Dartford, and both the illustrations and the descriptive matter are of great interest to those who wish to know the outlines of the subject of refrigerating machinery and the manufacture of CO_2. The main object of a maker's catalogue is not admittedly to teach students, but to induce customers to setting forth the merits of different types of machines for various classes of work; both the main and the subsidiary objects may be served in the publication. The portable cold store chambers and refrigerating plant for local service which is illustrated appears compact and equipped for the intended purpose. Special thermometers, CO_2 cylinders, ice tanks, log books, gas testing apparatus and other details for cold storage are described and may be ordered by the wiring of a code word representing what is required.

BATTLESHIP FLOATING DOCK.

AN immense floating dock for the British Admiralty was successfully launched on Thursday, 4th January, from the Wallsend Shipyard of Messrs. Swan, Hunter & Wigham Richardson, Ltd. Some idea may be gained of its size when it is known that the ground area it covers is no less than two and a quarter acres, while the total height of the side walls is sixty six feet. This is one of three docks that Messrs. Swan, Hunter & Wigham Richardson, Ltd., are constructing at present for the British Admiralty, for whom they also built a battleship dock several years ago. This last named was designed for accommodating vessels displacing 17,000 tons, and is stationed at Bermuda. The dock that has just been launched has nearly twice that lifting capacity, namely, 32,000 tons. In addition to the docks built for the British Admiralty, others have been constructed at the Wallsend Shipyard for various other Governments. The way in which these immense structures can be towed to distant parts is most remarkable. The British Admiralty dock for Bermuda was towed nearly 4,000 miles to its destination. The floating dock for the Natal Government was towed over 8,000 miles to Durban, and a 7,000 ton dock was safely delivered a year or two ago at Calao, the port of Lima, in Peru, the distance from the Wallsend Shipyard being about 11,000 miles. Other docks built by the same firm have been towed to various European ports, and also to more distant ones, such as Para in Brazil, Port of Spain in the Island of Trinidad, Egypt, and the West Coast of Africa.

The dock that has just been launched is double-sided, and in designing it the builders have been closely associated with Messrs. Clark & Standfield of Westminster. At the bow end of the dock there is a pair of pivotted flying gangways, to give access from one wall of the dock to the other. In the walls of the dock is living accommodation for a number of officers and men. A complete telephone system is also installed to give communication between engine and boiler rooms and different parts of the dock. There are eight steam boilers, which have been constructed at the Neptune Engine Works of the builders. The pumps have been supplied by Messrs. Gwynnes, Ltd. There is also a very complete outfit of steam and hand capstans placed on the walls of the dock to warp vessels into position. The dock is lit by electricity throughout and on the walls are two electric travelling cranes. In order to facilitate rapid repairs, a commodious workshop is provided in one of the walls with an equipment of machine tools and all necessary plant and appliances. Preservative bituminous enamel and solution by Messrs. W. Briggs & Sons, Ltd., of Dundee has been applied to the dock externally and internally.

Altogether the dock will represent the most complete and efficient means of overhauling and repairing the largest type of modern battleship yet designed or constructed. It is a worthy product of the famous Wallsend Shipyard and a fitting addition to the greatest navy the world has known.

THE [illegible] has recently [illegible] on record a distance of 1,333 miles [illegible] eight seamen. The journey was from [illegible] to Buenos Ayres (Argentine).

Safety of Ships at Sea.—Mr. W. S. Abell, Professor of Naval Architecture at the University of Liverpool, read a paper recently to the members of the Liverpool Engineering Society on this subject. Dealing with the danger of a vessel capsizing when, as the result of loss of control, she took up a broadside position to the waves, he said that the righting couple tending to bring a ship back to the upright depended on two things—(a) the form of the ship, and (b) the way in which the cargo was disposed in a vertical direction. It was therefore, necessary, either to design the vessel so that its centre of gravity could not be too high, or, where this could not be done, to arrange rules for loading to bring about the same result. Increasing the breadth of the ship improved the stability, and, other things being the same, it was necessary to settle the correct proportions of breadth to total depth of structure. It appeared that the modern ship was approaching the proportions of the narrow, deep vessels which were largely built between 1870 and 1880, and statistics of losses of ships of that type showed that when the proportion of breadth to depth was about 1.45 the missing vessels were about one-sixth of the total number afloat. When the breadth had risen to 1.6 times the depth the losses were not more than for any other type of vessel. The opinion was expressed that in vessels where this ratio is 1.5 and under the stability of the vessel required investigation.

Shipwrights' Company.—At the recent meeting of the Educational Trust Fund Committee of the Worshipful Company of Shipwrights, the annual grants were made to the following Universities and Institutions for the purpose of providing scholarships and prizes to students in Naval Architecture: The University of Glasgow, a scholarship given by the Worshipful Company of Fishmongers; The Royal Naval College, Greenwich, a scholarship given by the Worshipful Company of Skinners; The University of Durham (Armstrong College), a scholarship. Sums of money for prizes, to be spent in books and instruments, were voted to the Portsmouth Education Committee, Devonport Municipal School of Science and Art, Sunderland Technical College, Glasgow and West of Scotland Technical College, The Education Department at Chatham, Sheerness Higher Education Committee, Clydebank Technical Institute, Sunderland Technical College, Dumbarton School of Science and Art, London County Council School of Engineering and Navigation, and the Technical Classes at Wallsend. Among those members of the committee who were present at the meeting of the committee were the following: Sir William H. White, K.C.B., F.R.S., chairman; Mr. T. L. Devitt, chairman of Lloyd's; Sir Philip Watts, K.C.B., F.R.S., Professor J. H. Biles, LL.D., Dr. Clement Godson, V.D., J. Bell White, Esq., Rt. Hon. Sir Edward Clarke, K.C., P.C., and Mr. S. J. P. Thearle, D.Sc., the chief ship surveyor of Lloyd's. Application for assistance from young men studying Naval Architecture were laid before the committee, but, owing to lack of funds, had to be refused.

The Court of election of the Worshipful Company of Shipwrights was held at the Grand Hotel, Northumberland Avenue, on the 22nd January, when the following members of the Court of Assistants were present:—The Master, Clement Godson, Esq., M.D., C.M., V.D., Mr. J. Bell White, Senior Warden, Col. Sir William D. Dunn (Alderman), Third Warden, Sir Philip Watts, Fourth Warden, Sir William H. White, K.C.B., F.R.S., Pastmaster Mr. H. T. Bailey, Pastmaster Mr. Deputy J. L. Sayer, Pastmaster Professor J. H. Biles, Pastmaster Mr. H. W. S. Baden-Powell, K.C., Mr. T. L. Devitt, Mr. James Dunn, Mr. A. J. Fells and Col. T. Davis-Sewell. The following members of the Court were unanimously chosen to hold office for the year 1912:—Mr. J. Bell, White to be Master, Rt. Hon. Sir Edward Clarke, K.C., P.C. Senior Warden, Col. Sir Wm. H. Dunn, Alderman, Second Warden, Col. Sir Philip Watts, M.C.B., F.R.S., Third Warden, and the Rt. Hon. Lord Allerton to be Fourth Warden. The following were admitted to the Livery of the Company:—Mr. Peter Denny (Messrs. Denny, Dumbarton), Mr. R. Doxford (Messrs. Doxfords, Sunderland), Mr. Christopher Head, Mr. W. L. Hichens (chairman of Messrs. Cammell, Laird & Co.), and Mr. E. H. Mitchell (of the same firm). The Court resolved that for the future one-half of the fine paid for admission to the livery should be handed over to the Educational Trust Fund and Committee in order to increase the income available for granting assistance to students in naval architecture.

FOREIGN NOTES.

France.

THE Messageries Maritimes having entered into a Mail contract with the French Government have now, in order to cope with the increased requirements, placed orders for four steamers with several shipbuilding yards. The chief particulars of these new vessels are as follows, *viz.*: Length, 155 metres; beam, 19 metres; and displacement will be 13,000 tons. They will have passenger accommodation for the first, second and third class, and in addition accommodation for about 1,000 steerage passengers. The speed of the vessels is to be 15½ knots. They will be fitted with wireless, electric light, and other modern equipment. The Messageries Maritimes will construct one and the Forges et Chantiers de la Mediterranee, de la Gironde, et de la Loire, one each of the three remaining vessels.

The Societe d' Etudes is placing orders for three steamers of most modern construction for the American service. Their speed is to be 20½ knots, and the vessels will be specially and carefully designed to ensure this speed being easily maintained. The displacement is to be 15,000 tons, and the propelling machinery will be a combination of reciprocating and turbine engines, developing 19,000 h.p. The first steamer has been placed with the Chantiers de la Seyne, the second at Penhoet; the placing of the third steamer is still under consideration. The vessels are to be completed in 10 months.

The Chantiers de la Mediterranee have built and launched a cargo steamer *Ville d'Oran,* to the order of the Havraise Navigation Company.

The transports Maritimes des Marseilles has had a cargo steamer, *Mont Agel,* built at the Ateliers de France in the very short time of six months. The vessel was launched with boilers and engines already in place. Her length is 116 m., greatest beam 14.94 m., with a tonnage of 4,700 tons. The engine is of the triple expansion type of 2,000 I.H.P., and will give a speed of 10 knots.

Germany.

The German Steamship Company Hansa has had a new steamer the *O.J.D. Ahlers* built which has recently successfully completed her trials. She is built to the highest class of the German Lloyd, and is of the following dimensions: Length, 150 m.; beam, 18 m.; with a loading capacity of 11,000 tons. The contracted speed of 11 knots was exceeded on her trials, the engines on the quadruple expansion system of 3,000 I.H.P. working very efficiently. The cargo is dealt with by 16 winches and 18 derricks, one of these having a lifting power of 40 tons.

The *Kaiser Wilhelm der Zweite,* a fast river steamer for passenger service on the Rhine has just been launched at Cologne-Deutz. Her length is 80 m., beam 8.5 m., draft 1.8 m., and she is constructed as a paddle wheel steamer and has a very spacious elegant saloon. The boiler is a water tube boiler, Dürr system, with superheating apparatus enabling the engine to develop 1250 I.H.P.

The *Bahia Blanca* has been launched at the Reiherstieg Yard, having been built to the order of the Hamburg South American Shipping Company. She is to be used as a cargo and passenger steamer on the South American line. The *Bahia Blanca* is a twin screw steamer of 155.45 m. length, beam 18.69 m., draft 8.23 m., with 12,000 tons carrying capacity. She has two triple expansion engines developing together 4,300 I.H.P., giving a speed of 12 knots. The accommodation for 2,500 steerage passengers is fitted with all the arrangements to conform to the German and Spanish regulations for emigrant ships.

A new passenger and cargo steamer for the Hamburg America Line was launched recently from the Vulcan Yard at Vegesack. The vessel was given the name of *Wasgenwald,* and her dimensions are: Length, 108.5 m., beam, 15 m., capacity 5,500 tons. The engine is of the quadruple expansion type developing 3,200 I.H.P., and the speed is 12 knots.

Other orders have been placed with German builders by German shipping companies, and the important ones are: Four large steamers of 9,000 tons each to Bremen shipyards by the German Shipping Company Hansa for their South America line. An ocean liner of 50,000 tons

to Blohm & Voss, Hamburg, by the Hamburg America Line for the North American passenger service.

A new cargo steamer named [illegible], built at a Flensburg Yard, has recently gone through her trial runs satisfactorily. She is specially noteworthy, as she is constructed on the Cantilever system patented by Sir Raylton Dixon & Co., Ltd. The vessel has a carrying power of 3,000 tons on a draft of 5.09 m. The engines and boilers are placed amidships, developing 1,400 I.H.P., and give the [illegible] a speed of 11 knots.

The German Levant Line has placed an order for two steamers of 6,400 tons each with the Neptune Yard at Rostock.

The shipping firm H. S. Horn has placed an order for a cargo steamer with the English firm of Messrs. Craig, Taylor & Co., Stockton.

The Hamburg America Line has placed an order for a cargo steamer of 8,000 tons and engines of 2,500 I.H.P., with the Rickmers Shipyard at Geestemunde.

It is reported that the German Government has the intention of establishing a dockyard at Emden on the North Sea. The date of this new move in the German Naval programme has not yet been definitely determined.

Cargo Steamer *Arnfried*, of 5,000 tons, constructed for the Hamburg-Bremen Afrika Line by the Actien Gesellschaft "Weser," Bremen

Egypt.

The *Aïda* has just been delivered by the Chantiers de la Loire for the Egyptian Government. It will be remembered by a notice of the *Aïda* in this Journal some time ago, that the French firm secured this order in the face of competing English, German and other French firms. The *Aïda* is 73 m. long, her beam is 9.7 m., she has a displacement of 1,600 tons, and her engine power is 1,200 I.H.P. The vessel is intended for the use of the Admiral on his inspection voyages along the coast. There is a commodation for native subalterns, 15 lighthouse attendants, who are being taken to their respective stations, and for a number of artisans, etc., during conveyance from place to place. The *Aïda* was built for the price of [illegible] francs by the Chantiers de la Loire.

Spain.

It is reported that the Conservative Cabinet now in power has very considerably extended the programme for the building of the new fleet. Very shortly three new war vessels are to be commenced, each of 20,000 tons, about 1,300 tons larger than the last ones. It is stated that these ships are to be constructed by Messrs. Vickers, Ltd., at their Spanish Yards.

Russia.

The well-known French establishment for the construction of guns and warships of Creuzot is negotiating with the Russian Government for the erection of a branch establishment in Russia, which would probably take place on a site near Reval. A further competitor is also appearing on the scene, as Messrs. Beardmore & Co., of Dalmuir, are also endeavouring to acquire property near Reval for the same purpose as Creuzot, *viz.*, to build warships and to construct guns including plant for armour plates. Another French firm, A. Normand, of Havre, is also negotiating for a large tract of land at Seewald near Reval, with the intention of laying down an extensive shipbuilding establishment for the construction mainly of submarine craft, torpedo boats and destroyers. These three firms anticipate securing some of the large orders which the Russian Government will very shortly place for a number of war vessels of various types.

Japan.

The Kawasaki Shipbuilding Yard at Kobe has entrusted the German Engineering Works, Duisburg, with the laying down of a shipway of 300 m. length. It is to be fitted with the most modern crane equipment for handling the heavy materials to be used in the yard. It is reported that the construction of ships in Japanese yards cost a greater amount owing to the inexperience of the Japanese hands and the consequent waste of material than that of ships bought from abroad notwithstanding the high import duties. The Nippon and Osaka Companies have decided to order some steamers abroad. The Minister for Public Works, it is stated, is endeavouring to remedy this.

The new armoured cruiser *Kirishuna*, which is to be built at Mitsu Bishi Yard, is to have a displacement exceeding [illegible] tons. The construction of this vessel is to be commenced as soon as the numerous staff engaged in controlling the building of the Assaye at Barrow has returned to Japan. The turbines of this new vessel are to develop [illegible] h.p.

Austria.

The equipment of the *Viribus Unitis*, the first Austrian Dreadnought, is being rapidly proceeded with so that the

battleship will be able to join the fleet in September of this year. The second Dreadnought *H* has also been pushed ahead so that it will be launched in the spring of next year. The keel of the third ship of this type the *F*, is also to be laid down shortly. Great activity is prevailing in the Stabilimento Tecnico and at the Montalcone Yard, so that the launch of the cruiser *G* may also soon be expected to take place. The cruiser is a sister ship of *Admiral Spaun*. At the Danubia shipyard the torpedoes *A* to *D* are being built and great progress has been made in their construction, so that they will also soon be put into the water.

Italy.

The *Adriatico*, a cargo steamer of 5,240 tons, now being built at a shipyard of Ancona, is to be launched in March, and on being equipped with her engines of 2,000 h.p., she is to at once enter on her Atlantic service. Another steamer will moreover soon be ready for taking the water, *viz.*, the *Tevere*, of 2,640 tons, engines 1,400 h.p., by the Odero shipyard.

Canada.

The Steel Company of Canada is developing its resources, and has in view an extension of its operations to undertake the manufacture of wire, for which there is a good demand. Meantime, two new furnaces and the necessary adjuncts for making rods and bars are in course of erection.

OBITUARY.

Death of a Noted Shipbuilder.

WE regret to have to record the death of Mr. Robert Zimmerman, a noted shipbuilder, which took place in Schleswig Holstein on the 6th inst. He was a German and came over to this country after he had received his training at the Berlin University, and took a situation in the draughtsman's office of Messrs. Scott, of Greenock, where he remained a year. He then went to Messrs. Palmer's, of Jarrow, where he remained several years, and afterwards was chief naval architect under the late Mr. W. John, at the Barrow Shipbuilding Company's works. He left there to become shipbuilding director of the Germania yard at Dantzic. He remained with this firm for ten years, when he removed to Stettin and assumed the shipbuilding directorship of the great Vulcan Yard there. He built at the latter yard the *Kaiser Wilhelm*, the *Empress Frederick*, the *Deutschland*, and several of the crack steamers of the Hamburg-American and North German Lloyd's lines, and also several "Dreadnoughts" and several other warships for the German, Chinese, Brazilian and Turkish Navies. He left the Stettin yard twelve months ago and retired from business, but before doing so he planned the new shipbuilding yard for the Vulcan Company at Hamburg. Mr. Zimmerman was very well known in shipbuilding circles in this country, and was a very frequent visitor in connection with the business of the German firms he was associated with. He leaves a widow, two sons and three daughters.

EXHIBITION OF NON-FERROUS METALS.—The preliminary circulars announcing the arrangements for this Exhibition to be held in the Agricultural Hall, Islington, in May, are now issued, and from the large number of supporters whose names are noted in the list, the Exhibition promises to be very interesting and valuable. There are many problems in connection with non-ferrous metals not yet satisfactorily solved, and no doubt the difficulties experienced with such will be illustrated by experienced manufacturers. Condenser tubes, ferrules, and packings may be mentioned as details of especial interest to marine engineers. Metal deposition for preservatives and protective purposes; anti-friction metals and lubrication requirements are also matters which may well be included and detailed by means of exhibits and lectures. It is hoped that the results of the experiments and researches conducted under the auspices of the Institute of Metals will be illustrated at the Exhibition, as the papers which have been read on composite metals before the Institute indicate that much has to be learned by the users of these metals to guide them in their choice of percentages to obtain one best suited to their purposes.

THERMO-FEED BOILER FEED REGULATOR AND DIFFERENTIAL GOVERNOR.

THE rate of development in mechanical devices in order to improve their efficiency or reduce their cost has much increased of late years and the efforts of manufacturers to improve their products is a very useful sign of the times. As an example of this

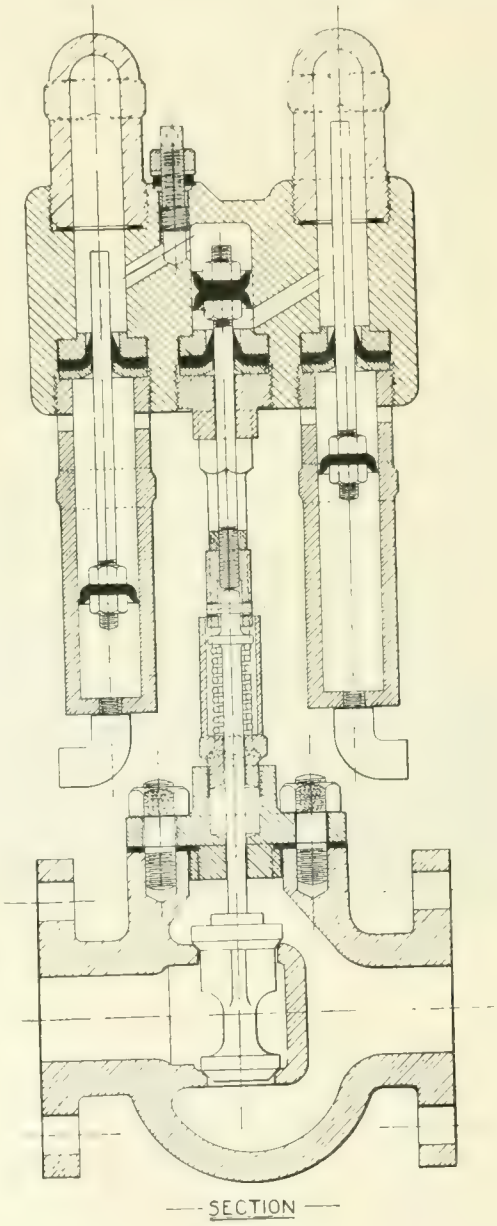


Fig. 2

in our October issue of last year we illustrated the form of Thermo-feed arrangement, manufactured by Messrs. Ronald Trist & Coy., Ltd., of Lloyd's Avenue, London, and since that time they have made some considerable modifications in the construction which materially improve the action of the device. Any thing which will reduce the range of water level in a steam boiler must of necessity tend towards economy and it

is stated that the new form of regulator gives full control from zero to full feed within a range of ⅛ inch of the water level. In the adjoining illustrations, Fig. 1 shows the new form of regulator in which the float is directly coupled by pairs of levers to the control valve while the latter has been placed in a vertical position high up above the water level and thus out of contact with any scum which might collect on the surface of the water. Furthermore, the valve and operating gear is made readily adjustable from the exterior for variation of water level, and is so constructed as to be easily taken to pieces for examination and repair at any time. The particular method of making the double-seated valve and valve seats as a self-contained part enables a spare device to be kept in stock and changed at very short notice and in a few minutes.

The feed check valve control device is materially modified in the direction of substituting a cylinder and piston with a Sea Ring cup in place of a flexible diaphragm, and in arranging the spring at the upper part and at the side of the device away from the heat instead of about the valve spindle. This not only renders adjustment of the spring a simple and easy matter, but also leaves the gland nut free for removal for repacking without dismantling the device as a whole.

The lever can be used, if necessary, for operating the check valve by hand for independent control, a tommy bar being inserted in the socket to increase the leverage, if desired.

In order to provide automatic means for controlling the admission of steam to the steam pump when feeding, for example, a battery of boilers fitted with Thermo-feed regulators an ingenious form of differential governor has been designed which we show in Fig. 2. The valve indicated here is the admission valve on the steam supply to the pump and is spring pressed so that it tends to open and admit steam to the steam pump. The valve spindle carries a piston at its upper end, which works in an oil cylinder, having an upper communicating passage leading to a left-hand ram and a lower passage leading to a right-hand ram. The left-hand ram is attached to a piston working in a cylinder connected with the feed pipe line and a similar piston in the right-hand cylinder is in connection with the steam pressure driving the pump.

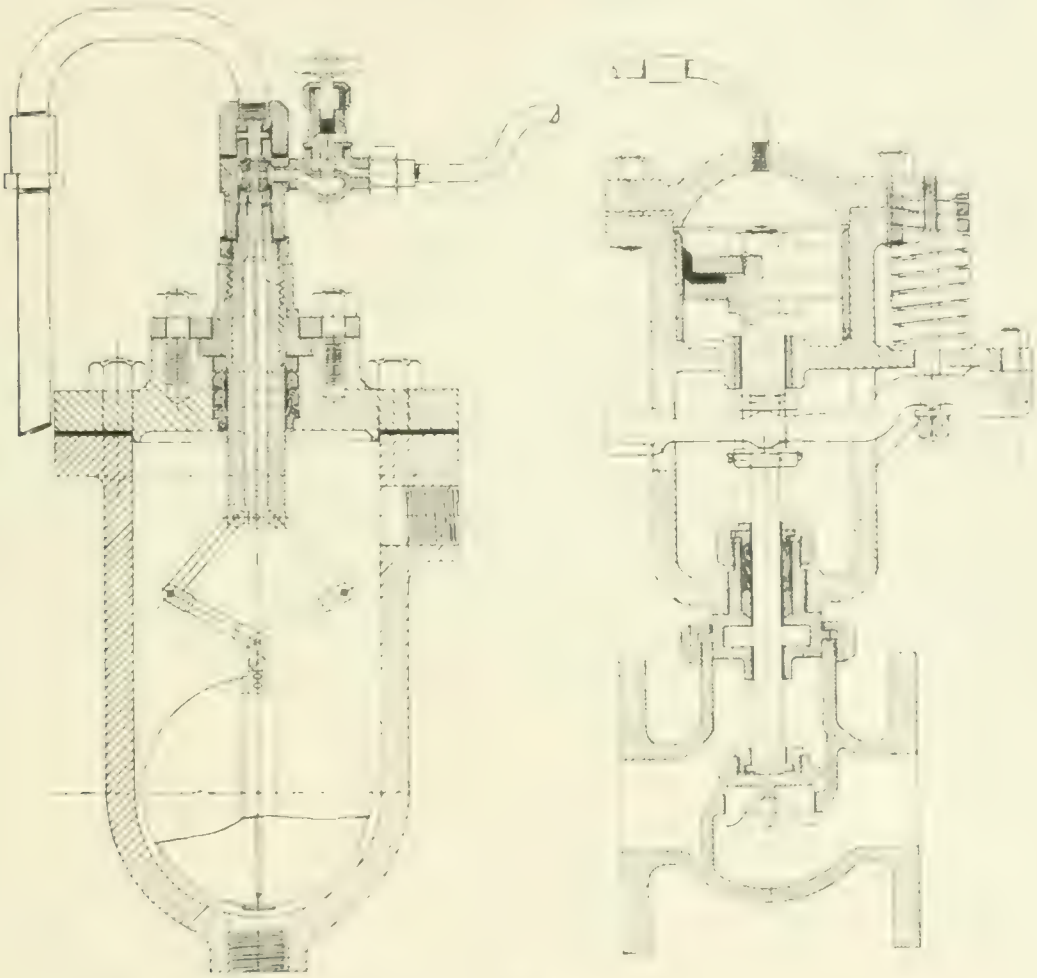


Fig. 2

So long as the pressure in the feed pipe line is only sufficient to feed the boilers, the steam valve to the steam pump is maintained open by the spring, but when the feed delivery is checked, the pressure rises and acts on the left-hand piston against the steam pressure on the right-hand piston, and the oil acting as

the transmitting medium causes the valve piston to descend and close the steam valve more or less, until the flow of feed water into the boilers is again increased and the pressure reduced, when the differential pressure opens the steam valve again and the pump increases its rate of action.

By a combination of the two devices described, the supply of feed water to a battery of boilers by a steam-driven pump is entirely automatically controlled in an absolutely reliable manner.

The same governor can be used for controlling hydraulic pressures or compressed air pressures of any amount independent of the steam pressure operating the pump, by varying the areas of the balancing arrangements on the two sides of the device.

BOOKS AND CATALOGUES RECEIVED.

The Steam Turbine (The Rede Lecture, 1911), by Sir Charles A. Parsons, K.C.B. Cambridge University Press. Price 1s. 6d.

Munro's Marine Engineers Annual, 1912. Glasgow, James Munro & Co., Ltd. Price 1s.

Reed's Sunderland Tide Tables, 1912. Price 6d.

Warship Engineering (reprinted from Janes Fighting Ships). By C. de Grave Sells, M.I.C.E.

Calendars have been received from the following firms :—The United States Metallic Packing Co., Ltd., Bradford, an ornamental calendar showing in relief thereon a figure of "The Echo." Messrs. Alfred Graham & Co., London, S.E., makers of loud-speaking naval telephones, a very useful combined almanack, desk diary and blotting pad. Messrs. Frank & Son, South Shields, specialists in marine photography, a calendar showing a large illustration of the *Guildford Castle* during speed trial on the Clyde and printed in collotype. Submarine Signal Company, a calendar tastefully arranged with a view of the South Stack Lighthouse. The Welin Davit & Engineering Co., Ltd., The Lighthouse Literature Mission and Messrs. Waterman & Ross, London, Calendars. Messrs. J. W. Brooke & Co., Ltd., Lowestoft, a nicely arranged note block. Messrs. Hayward, Tyler & Co., Ltd., a pocket book and diary for 1912, containing in addition some very useful tables.

Catalogues from the following firms are to hand. The Westinghouse Company, a new catalogue attractively arranged on the loose leaf system, and has in it sections relating to electric lamps, accessories, fittings and glassware, cables, wires and conduits, cooking and heating and electric fans ; Messrs. Alfred Graham & Company, giving an abridged list of vessels fitted with Graham's patent loud-speaking naval telephones ; Siemens Bros. Dynamo Works, Ltd., second edition of price list No. 2 on electric supplies ; Messrs. R. L. Ross & Company, Ltd., Stockport, a booklet describing the "Ross" patent muffled pop safety valve ; Messrs. Perkin & Company, Ltd., Leeds, drilling machines ; Messrs. Samuel Denison & Son, Ltd., Leeds, testing machines ; Messrs. Rotherham & Sons, Coventry, lubricators, pressure gauges, oil cups, etc. ; Messrs. Wm. Wadsworth & Sons, Bolton, overhead runways and transporters.

WIRELESS TELEGRAPHY FOR NAVAL PURPOSES.—A paper under the above title was read by Mr. H. Clifford Stroud before the Graduate Section of the N.E.C. Institute of Engineers and Shipbuilders on the 13th January.

The Bolinders' oil-engined coaster named *Orgarita*, built to the order of Messrs. Pollock has made four very good trials on crude oil, obtaining a speed of 10 miles per hour, and with three barges in tow of about 5 miles. The *Jutlandia* is still awaiting her machinery, with which Messrs. Barclay, Curle and Co. have been continuing their long-continued reliability trials, formerly referred to in detail and with extremely satisfactory results.

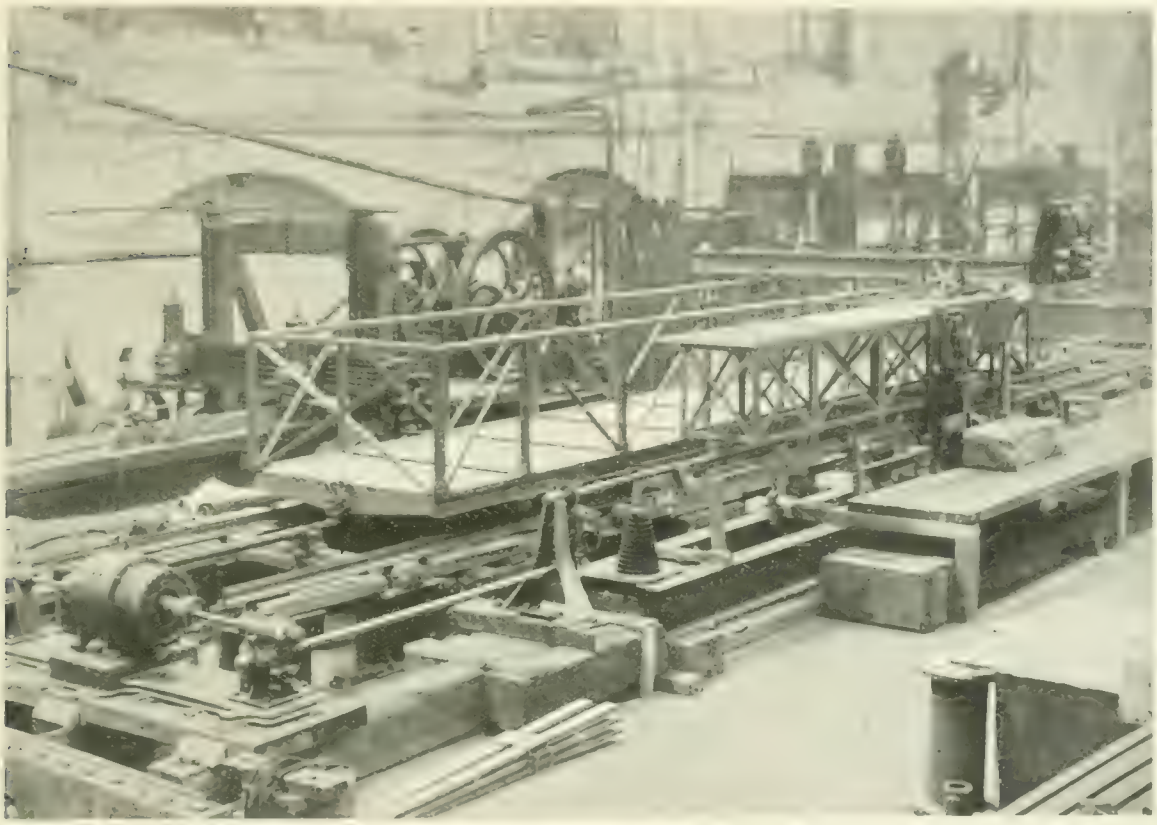
MAKING MODELS OF SHIPS FOR THE EXPERIMENTAL TANK.

REFERRING to the important *Olympic-Hawke* trial, it is notable as being the first time that an opportunity has arisen of proving to satisfaction the immense advantage of both the experimental tank, which was presented by Mr. Yarrow and established at the National Physical Laboratory at Teddington, and the delicate machinery necessary, which must of necessity be in the highest degree absolutely accurate for making the wax models. The first step in the manufacture of the wax model is attached to the melting tank, which is a large galvanized tank, capable of holding about one-and-a-half tons of the paraffin wax, and is water-jacketed all round, and has iron tubes running through it for supplying the necessary heat to melt the wax, at about 212 degrees Fahr., which is obtained in the ordinary manner from an adjoining boiler.

From this tank the molten wax is run off through two leads into the mould, the leads being taken off near the bottom of the tank in order to avoid sediment. The bottom of the tank is inclined, so that any impurities which would naturally sink will collect at one end and be easily removed. The tank is fitted with thermometer, water gauge and the usual accessories.

After the wax is taken from the set the upper surface of the mould so formed is trimmed flat in order to give a surface which will serve as a base, from which the entire wax model will be completed only in reverse position. This levelling process is executed by a separate machine, which consists of a rotary cutter driven by a vertical motor. After the surface has been cut absolutely accurate, the next stage in the operation is to remove the wax model to the shaping machine. This consists of a rectangular carriage which runs on machined rails, and has framed sides covered with canvas to prevent the wax cuttings from being scattered broadcast. Alongside this carriage is a table which also runs on rails, which are mounted on the top of cast-iron standards in order to bring the top of the table to a suitable working height. The table carries the drawing, giving the various water lines to which the model has to be shaped, and as it is necessary that the travel of the table should bear the same ratio to the travel of the carriage, that the size of the drawing bears to the wax model, a change wheel gear is introduced in the table drive. The wax model is operated on by two rotary cutters driven by vertical electric motors in the same way that the cutter is driven in the surface-trimming machine already referred to. When the machine is in operation, and a wax model is being worked on, the indicator is set to the exact height for the water-line which is being copied from the drawing, and at the same time the travel ratio of the carriage and table is arranged to suit the scale of the drawing. The process is repeated with all the water-lines on the drawing, so that the model is finally cut to form in a series of steps, each step being of the correct form for its depth. The intermediate material is then removed by hand, and the model trimmed and scraped to its final form. After shaping, the model is removed to the measuring and recording table, which is used to record and

verify the models after construction. The recording or verifying arrangement consists of a copying arm with a finger, which can be moved over the surface of the model at any cross section. The other end of the arm carries a pencil, which traces the half-section on a drawing as the finger is moved over the surface of the model. The weight of the finished model has to be carefully taken by a weighing machine, which has a capacity of 2,500 lbs., and is graduated in $\frac{1}{10}$th lb. divisions. The whole of the above apparatus has been supplied by Messrs. W. & T. Avery, Ltd., of Birmingham.



General view of Avery's Wax Model Shaping Machine, supplied to the National Physical Laboratory.

REVIEWS.

A Course of Elementary Workshop Arithmetic. By H. A. Darling. Price 1s. 6d. London: Blackie & Son.

THE [illegible] valuable to those youths who, realizing their own shortcomings [illegible] their occupations, whatever they may be. Lord Rosebery [illegible] the rudiments of the [illegible] and clear in its enunciation of problems. The answers being [illegible]

methods of working questions are explained and from examples given the rest of understanding may be applied. The number of [illegible] the rudiments should be thoroughly grounded into the pupils in preliminary [illegible] and the system is not conducive to clear thinking or logical reasoning, not [illegible] to build up character.

Boilers and Boiler Control. By J. B. C. Kershaw. Price [illegible] London: Davis Bros.

THIS is a small handbook for engineers and firemen in charge of boilers to assist in giving a clearer comprehension of the subject of steam raising and maintaining economically and at the same time of maintaining it not eliminating the causes of the pollution of the atmosphere by smoke from coal burn-

The economical use of coal in steam boilers is not only a personal consideration to the employer but a national one, in view of the higher virtue obtained from a limited asset the conservation of which grows in importance as years roll on. The clearing of the atmosphere is also of importance to the employer and community, the former that he may meet the sanitary authority with a smiling face and the latter that they may behold with unobstructed vision the features of the landscape and breathe uncontaminated air. The supply of air to the furnace for the best combustion of fuel is dealt with in regard to quantity and [illegible] with notes on the characteristics of anthracite and bituminous coal and [illegible] Typical Lancashire horizontal cross section chambers are illustrated and briefly described. The products of combustion, natural and artificial draught [illegible] transmission and the necessity of clean surfaces, both on the [illegible] stokers are described and illustrated. Temperature and analysis tests of waste gases, rules for firing, water, its impurities [illegible]

study of what is necessary for the fulfilment of his duties carefully and economically.

Refrigeration, Cold Storage and Ice-Making. By A. J. Wallis-Taylor. Crosby Lockwood & Son. Price 10/- nett.

THIS is a new and much enlarged edition of a former volume by the same author, and as the smaller one was appreciated by engineers who desired to equip themselves for what might be before them, the new volume will appeal to those who desire to study the subject on which it deals. The introduction deals briefly with the origin of withdrawing heat from water and various commodities in order to satisfy the wants of man by providing cooling draughts or for preservative purposes, and, as experience was gained, by transporting from one sphere the abundance which another lacked to meet the requirements of that other. The growth of the trade in refrigerated produce has increased enormously during the thirty years or so since it was looked upon as experimental, and it is still increasing. Every marine engineer should study the subject, and the library of every steamer might fittingly be furnished with a standard volume on the subject to encourage the junior engineers to acquaint themselves with the theory of refrigeration and the different systems fitted for the carriage of produce. The theory and practice of ice-making and refrigeration is dealt with after the introduction, and the author then proceeds to describe in detail the different processes for the abstraction of heat, by liquefaction, with a table of freezing mixtures; by vacuum due to the evaporation of part of a liquid; by compression, where the heat of compression is removed by cooling jackets and the gas then allowed to expand; under the heading of the compression process, the various types of machines now fitted are described and illustrated, the different makers being represented, not only in respect to their general arrangement of refrigerators, but to the more important details in section. The absorption process—where a volatile agent is used—is next described, including a list of patents and arrangements of machines in use for ice-making and cooling purposes. The cold-air system, less familiar now in practice than twenty years ago, has a chapter devoted to its description and the details of well-known types. This system has the advantage of being complete in itself without the aid of chemicals, the disadvantages are discussed as well as the advantages. The small but important details in connection with the regulating of the elements used in the different systems are next illustrated and described; pipe arrangement; insulation, with tests of non-conducting materials; cold storage chambers and methods of construction; transit vans, conveyers and hoists; temperatures for different substances, fish, flesh, fowl, fruits, vegetables and liquids; application of refrigeration to breweries, dairies, etc.; ice-making and management and testing of machinery. From this summary of the contents it will be seen that this book is comprehensive, and with the illustrations embodied within its pages its utility will be manifest to those who desire to study the subject of refrigeration. In an appendix is given a list of books published dealing with special aspects of cold storage.

Marine Engineering Estimates and Costs. By C. R. Bruce, M. Inst. Nav. Archt., etc. Glasgow: Fraser, Asher & Co., Ltd.

THIS is a small work written for the benefit of those engaged in the technical and commercial sides of engineering and shipbuilding in the direction of giving useful information as to the preparation of estimates of cost of marine engineering work. It has been customary in past ages for the commercial and technical departments of an engineering business to be so divided from one another that the average engineer is hopelessly astray where the financial aspect of his work is presented to him. The purpose of the author is to fill this gap and to provide an effective link between the technical and commercial departments by the presentation in a simple manner of those general principles which underlie the preparation of estimates for new work, and the costing of machinery passing through the shops. After a general opening dealing with inquiry and specification of work the author deals with the agreement or contract, the division of work between machinery and hull, the estimate on a standard basis, engine and boiler rough weights and wages, establishment charges, the final abstract sheet, the determination of approximate machinery sizes, the commercial aspect of the drawing office, the keeping of costs by the accounting system, the keeping of costs by the card system, the bonus or premium system, the relative costs of different types of marine propelling machinery, and the trend of development in marine propulsion. Some useful examples of estimates and particulars are given at the end of the book which give point to the matters set out in the chapters dealing with the subject in detail. The work only comprises 126 pages, but owing to the conciseness of treatment and lucidity of expression the length of the work is in no way a proper measure of its value, as each reader will find its subject is not only easy to grasp, but the resultant effect of the study will be a great assistance in a methodical treatment of estimating on a commercial basis.

Royal Navy List. London: Witherby & Co. Price 10/-.

THE quarterly Royal Navy List is just to hand, and, as usual, forms a very comprehensive guide to the *personnel* of the Navy, active and retired, the ships of the Fleet, and a summary of commissions of ships. In addition, a considerable amount of other information is given, and in the 137th number now under notice, a new feature has been included, *viz.*, an article on "The Current History of Foreign Navies." It is intended that the articles, which will be continued each quarter, shall be brief and concise accounts of the progress of foreign navies during the preceding quarter. Judging from the first instalment, where the present condition of the navies of the foreign powers have been summarised under their respective countries, the articles will be much appreciated, as the reader will be able to compare the progress of one Power with another periodically.

Who's Who, 1912. London: A. & C. Black. Price 10/-.

THE 1912 edition of this old established work contains 2,364 pages, and deals with no less than 24,000 biographies. In order that the work shall be accurate in its information every biography is submitted for personal revision. This is a stupendous task, but the labour and expense involved are amply repaid by obtaining a work of reference complete and accurate in its detail. "Who's Who" has now so completely established itself that it has become almost a necessity, and its help and assistance are sought every day in the office and home. The biographies are conveniently arranged alphabetically, and from the wealth of information contained under each name we are able to find all that it is necessary to know about any name we may require.

As a companion to this volume the same publishers issue the **Who's Who Year Book,** price 1s., which contains the tables formerly published in "Who's Who," but now issued separately. Included in the Year Book are lists of Church dignitaries, judges, lawyers, M.P.'s, etc., and the lists may be used in conjunction with "Who's Who" in the following way: Anyone who is not sure of the M.P. for a certain division, for instance, can turn the name of the division up in the Year Book; against it will be found the name of the M.P., and the biographical details may be found in "Who's Who."

The Writers' and Artists' Year Book. London: A. & C. Black. Price 1/-.

THIS book has been published with a view to help an author to place stories and articles, and to this end the contents include lists of journals and magazines, provincial and over-sea newspapers, American journals and news agencies, literary agents and publishers all over the Empire and in America. New features include the names of syndicates which accept M.S.S. and Australasian, South African and Indian publishers. The author or artist has therefore at hand in one small volume the necessary information to enable him to place his products. The conditions under which work is accepted by the various journals is also set out, and in addition some valuable hints to the budding author is included.

The Navy League Annual for 1911-1912. London: John Murray. Price 2/6 nett.

THIS useful publication is now in its 8th year of issue, and its success is well assured, appealing as it does to a wide circle of readers who are interested in the strength and progress of the British Navy and the navies of foreign powers. The present edition of the work consists of 341

pages profusely illustrated with pictures of warships, many of the illustrations being full page ones. The first portion of the book deals with the navies of the world, followed by special articles, among which we find "The Declaration of London explained," by B. Eyres Monsell, R.N., M.P. "The Future of Russia in the Mediterranean," by [illegible] Portugaloff. "The Menace of Armed Merchantmen," by Comm. C. Crutchley, R.N.R., R.D. The editor, who is Mr. Alan H. Burgoyne, M.P., contributes some valuable articles and tables of information.

Pearson's Nautical Almanack. London: Imray, Laurie, Norie & Wilson, Ltd., Price 1/6.

THIS well known publication is in its 53rd annual edition, and purchasers will find the volume well worth the small charge made. The book is replete with information, and is indispensable to those connected with marine affairs. The volume was originally published at 6d., but in [illegible] the 6d. edition was discontinued, and the work was published at 1/[illegible]. The extended edition, the subject of this notice, was first issued in 1907, and contains [illegible] more valuable information than the cheaper edition.

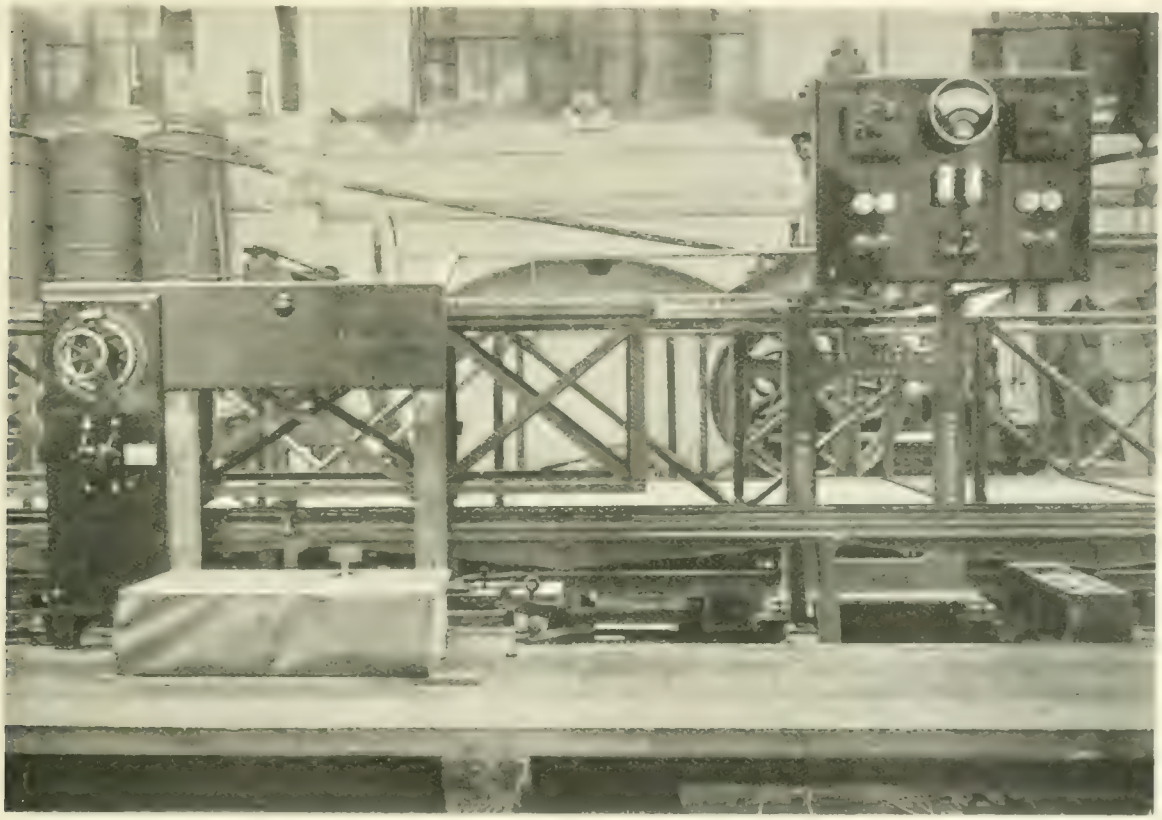
Official Year Book of the Scientific and Learned Societies of Great Britain and Ireland. Price [illegible] London: Charles Griffin & Co., Ltd.

THE 28th annual issue of this volume is now before us, and among the numerous year books which make their appearance year by year this one must take a [illegible] place owing to its usefulness to a large section of the public. It is a complete record of the work done by [illegible] literature and art throughout the world, and being compiled from [illegible] sources its information is correct and reliable. To the scientific worker and those engaged in literary pursuits the book must be most valuable, as it gives a resume of the subjects which have been brought before the societies during the year, and in addition gives the conditions of membership, history and organisation of the various societies.

Messrs. Constable & Co., Ltd., London, have recently issued several books of a series called the Electrical Installation Manuals, as follows:

Ship Wiring and Fitting, by [illegible] Price [illegible] nett, is intended to treat in a [illegible] the systems of wiring [illegible] fitting of electrical apparatus on ships of the mercantile marine. The volume does not [illegible] the special appliances and wiring systems in use on warships. The author has had practical experience in the fitting up of passenger and cargo steamers, and places his information before the reader in a clear and readable form.

Other volumes of the Series are **Arc Lamps and Accessory Apparatus**, by J. H. Johnson, A.M.I.E.E. Price 1/6 nett.



Switch Panels for Avery's Wax Model Shaping Machine for the National Physical Laboratory, Teddington

Mill and Factory Wiring, by R. G. Derry, A.M.I.E.E. Price 2/[illegible] nett.

Motors, Secondary Batteries, Measuring Instruments and Switch Gear, by S. Kenneth Broadfoot, A.M.I.E.E. Price 1/[illegible] nett.

Electrical Mining Installations, by P. W. Freudemacher, A.M.I.E.E. Price 2/[illegible] nett. The volumes deal fully with the subjects set out in the title, and are written by practical men for practical men. All the volumes are well illustrated and clearly [illegible], and are published at popular prices.

Whittaker's Arithmetic of Electrical Engineering [illegible] edition. London: Whittaker & Co. Price 1/[illegible] nett. This [illegible] book on the Arithmetic of Electrical Engineering has been prepared as a [illegible] to the [illegible] Electrical Engineering which are published by the same firm, and has been specially prepared to aid the student to assume the ability to calculate [illegible] and quickly. The book contains [illegible] worked examples and [illegible], and should be of great assistance to the [illegible] aimed at.

Mechanical World Pocket Diary for 1912. Price 6d.
Mechanical World" Electrical Pocket Book for 1912. Price 6d. Manchester: Emmott & Co., Ltd.

These well known annuals have recently been issued for 1912, and are excellent value for the small outlay. Both volumes have been carefully revised, many pages added, and considerable improvements have been effected.

List of Vessels Launched in 1911.

(Continued from page 237.)

SCOTCH.

A. & J. Inglis, Ltd., Pointhouse Shipyard, Glasgow.

Name of Vessel.	Built of	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
Ferry, Torpedo Boat	Steam Steel	British	780		15,000
Sylvia, Cargo Steamer	"	"	657		500
Prince Edward, Pass. Steamer	"	"	300		600
Leven, Pass. Str.		Foreign	2,340		1,200
Brussels, Pass. Str.	"	"	2,340		1,200
Reper, Steng. Petn. Tram Ferry	"	"	400		400
Excelsior, Kemp. Mexia. Tram Ferry	"	"	402		400

Bow, McLachlan & Co. Ltd., Paisley.

Princess Sophia, Singl. Screw		Colonial	2,400	-	
Nine		"	62	-	—
4 Barges	—	"	447		—
3 Barges	-	"	371	-	-
Hopper Barge		"	48	-	

VESSELS ENGINED.

I.H.P. for year, 2,350.

GERMAN.

Actien Gesellschaft "Weser," Bremen.

Name of Vessel.	Built of	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
† Armfried, Cargo boat	Steel	German	2,500	-	1,700
† Parnassos, Cargo boat	"	"	2,860		1,750
† Steinturm, Cargo boat	"	"	2,248	-	2,300
† Victoria, Frene, Pramnos, and Ceres, Cargo boats	"	"	6600a		3,000a
a O.E.D. Ahlers, Cargo boat		"	8,000		5,000
Thuringen, Lager	"	"			

Completed 9 vessels of about 34,218 G.R.T. and 9,950 I.H.P., exclusive of war vessels.

2 complete marine engine installations of 3,000 I.H.P. each, for the firm of Rickmers, of Bremerhaven, have been supplied.

Howaldtswerke A.G., Kiel.

Helgoland, Ironclad	Steel	Germany		11,600	22,000
Floating Dock	"	"		49,000	—
† Steinbeis, Cargo Steamer	"	"		1,440	720
Maria, Motor Dumb Hopper	"	"		214	120
Albert Ballin, Pass. Steamer	"	"		77	90
† Virginia, Cargo Steamer	"	"		1,379	800
2 Elevators	"	"	—	850	
m Motor Cargo Ship		"		2,800	2,000
2 Pontoons	"		-	410	
R.I. 1-4 Dumb Hopper	"			500	-
4 Pontoons	"	"		1,440	
Elevator	"	"		425	

WORK ON HAND.

Actien Gesellschaft "Weser," Bremen.

Magdeburg, Cruiser		German		—	
Stralsund, Cruiser					
No. 150, Liner					
17, Tug			100		-
dm 184, Cargo Boat			4,000		2 × 1,000
a 175			6,000		2,500
† 155			4,000		2,000
155-158			6600a		3,000a
a 160			7,000		2,500
† 161-172			6,500a		2,500a

1 [illegible] 1,720 G.R. and 16,250 I.H.P., in construction, exclusive of war vessels.

Howaldtswerke A.G., Kiel.

Kaiserin, Ironclad	Steel	Germany		11,000	
Cargo Steamer	"	"		[illegible]	950
Elbe, Gunboat Cruiser	"	"			-
dm Motor Cargo Ship	"			800	2,000
2 Oil Tank Steamers	"	"		3,000a	1,000a
4 Pontoons				[illegible]	
Pass. Steamer	"	"			25

THE NETHERLANDS.

Botje, Ensing & Co., Goningen, Holland.

Name of Vessel.	Built of	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
* Stantia IX., Cargo	Steel		[illegible]		[illegible]
* Concordia, Tug			193		[illegible]
* Maritje, Cargo			60		[illegible]
* Stoom Dock I., Tug	"		84		[illegible]
* Beatrix I., Tug	"		86		[illegible]

J. Mayers Shipbuilding Co., Zalt Bommel, Holland.

tc Matinhas, Scraper, Suction Dredger			880		400
* Pannerden II., Bucket Dredger			420		200
2 Ferry Boats			4,000	—	800a
3 Fishing Vessels			240		—
Several Towing Lighters			7,040		—

WORK ON HAND.

Botje, Ensing & Co., Goningen, Holland.

* Anne Augusta, Tug	Steel		80		100
* Emilie Leymann, Tug			84		100
* No. 133, Tug			105		150

J. Mayers Shipbuilding Co., Zalt Bommel, Holland.

One cargo steamer and several lighters.

RUSSIAN.

Putilow Works, St. Petersburg.

Name of Vessel.	Built of	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
* Belskaya I. Bucket Dredger		Russian		200	135
* Severo-Dvinskaya II. & III., Bucket Dredgers		"		2,[illegible]a	400a
Ladojskaya VIII. Bucket Dredger		"		200	130
* Nasosnaya Stantsia, I. & II., Floating Pumping Stations		"		1,[illegible]a	400a
t Novik, T.B. Destroyer		"	1,200dis.		9,000

WORK ON HAND.

t Chtchashvy, T.B. Destroyer	-	Russian	1,100dis.		25,000
* 2 Bucket Dredgers	-	"		2,[illegible]a	225a
Bucket Dredger	-	"		400	130
* 2 Lightships		"		4,[illegible]a	240a
* Bow-crane Ship		"		170	200
dm Pilot ship		"		182	375

ITALIAN.

Fiat San Giorgio, Spezia.

Name of Vessel.	Built of	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
Medusa, Velella, Argo, Fisalia Submarines		Italy			700a

Engined with heavy oil combustion engines, Fiat type.

The Fiat Co., Turin (Sole Agent A. G. Graziani & Co., London).

24 heavy oil engines for naval and mercantile marine purposes, totalling 7,250 I.H.P.

WORK ON HAND.

Amerigo Gori, Leghorn.

S.S. Schooner	Steel	Leghorn		800	
S.S.		"		700	
S.S.		"		250	
Sailing Schooner	Wood	"		100	

Fiat San Giorgio, Spezia.

4 more submersibles of the same type and power for the Italian Navy, one ditto for the Portuguese Navy, for the Brazilian Navy.

The Fiat Co., Turin (Sole Agent A. G. Graziani & Co., London).

20 heavy oil engines for naval and mercantile marine purposes, totalling 13,000 I.H.P.

AMERICAN.

Toledo Shipbuilding Co., Toledo, Ohio.

Name of Vessel.	Built of	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
† Chief Wanatah, Car Ferry	Steel	-	2,[illegible]	-	[illegible]

3 Tow Boats for river service.

WORK ON HAND.

* 1 Passenger boat		-	-	-	1,000

* Compound. † Triple. a Quadruple. dm Diesel motor. m Motor. t Turbine. tc Triple Compound.

JAPANESE.

Kaimu Sho Local Marine Bureau, Tokyo, Japan.

[illegible]

CHINESE.

William C. Jack & Co., Ltd., Hong Kong, China.

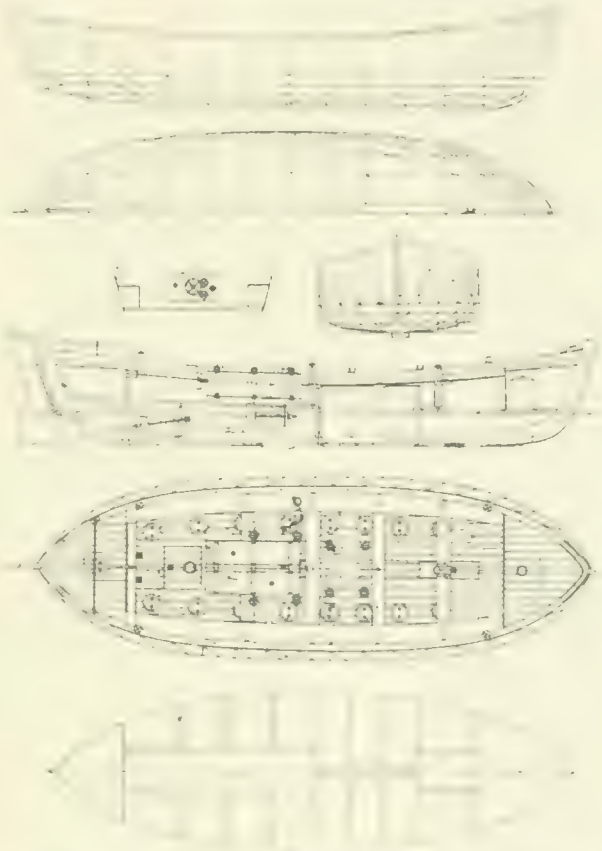
[illegible]

The above arrived too late for our January issue.

FIRST GERMAN MOTOR-DRIVEN LIFEBOAT.

THE German Society for the Rescue of Ship-wrecked Mariners a short time ago entrusted the Marine Department of Messrs. Gebrüder Koerting at Kiel with the construction of an open lifeboat about 30 feet in length, supplemented with sailing and rowing arrangements. This boat, which is the first German motor-driven lifeboat, has the following dimensions:—Length, 33 feet; breadth, 10 feet; depth, 4½ feet. The keel and frames are of oak, and the double bottom, bulkheads and fittings of teak. A pointed stern has been adopted with a view to insuring a satisfactory working of the boat. The vessel has been designed with a tunnelled stern to protect the propeller against wreck fragments and to insure a draught as low as possible. In order to warrant the buoyancy of the boat in the event of the skin being damaged or the interior being filled by a heavy sea, the boat is provided with a double bottom and longitudinal and transverse bulkheads, divided into twenty water-tight compartments accessible through manholes and lids; moreover, at certain positions, air receptacles are fitted above the double bottom. When heavy seas fill the boat the water is discharged through eight pipes fitted with recoil valves. Four benches are provided to accommodate eight oarsmen. The crew comprises ten men. The weight of the boat is about [illegible] lbs., and the average draught [illegible] inches.

The motive power is supplied by a two-cylinder 15 h.p. Koerting kerosene motor started by benzine. In addition to the electro-magnetic ignition, accumulator ignition is provided as a stand-by, thus allowing the gas mixture to be always safely ignited on starting; after starting the accumulator ignition is thrown out of gear. The three-wave propeller is operated by a Langenbach gearing, which [illegible] smooth passage from the forward to a backward course, thus reducing the strain on the propeller. The most important feature of the boat is the water-tight fitting of the motor, which does not interfere with its safety of operation and [illegible]. Over one of the compartments of the double bottom within the range of the motor, there is fitted a receptacle with three removable sides and a hinged lid. Rubber joints and screws are used to tighten these parts with one another. The rear wall of the receptacle is stationary, and serves to receive the hand-wheels, etc., for controlling the boat. The air supply with the receptacle closed is effected in the following manner: The motor receptacle is connected to the rear air receptacle by a tube, which in turn communicates through a floating valve with the outside air. A similar floating valve arranged farther forward communicates directly with the motor receptacle. As soon as the boat is filled with water the valves are closed and the motor drives its air from the air receptacle, until the water having been ejected through the self-discharging pipes, the valves are opened again. This arrangement has given much satisfaction in working. In connection with tests on



delivery the boat attained a speed of [illegible] knots over the measured mile, and during recent training and salvage trips behaved perfectly well, in spite of heavy seas and breakers.

[illegible] Mr. W. J. Willett [illegible] annual [illegible] matter of technical [illegible] audience heard a stimulati[illegible]

[illegible]

Industrial and Trade Notes.

THE CLYDE AND SCOTLAND.

(From our Own Correspondent.)

VERY few fresh contracts have been booked since the new year began, but one or two are of extra importance and generally speaking firms are very well provided for months to come in some cases "years" might be the term employed. Altogether there are under construction on the Clyde and other Scottish centres well over [illegible] tons of naval and mercantile shipping—probably the largest amount ever on hand at any one time. Remarkable as 1911 was in the matter of employment and output everything points to 1912 equalling if not exceeding it, provided labour unrest, which seems everywhere to be latent if not active, does not upset calculations and everything else.

New Cunarders.—The Cunard Company have commissioned Messrs. Scott's Shipbuilding and Engineering Co., Greenock, to build and engine two new liners for their fleet of passenger and cargo-ships whose length, it is understood, will approach 550 ft. and gross tonnage 13,000 tons. These are intended for their owner's Canadian trade, and accommodation will be provided in each for over 500 second class and over 1,500 third-class passengers. Messrs. Scott's Company have a two hundred years' record of good work behind them, and have built vessels for many owners, and the connection now obtained with the famous Cunard Company is particularly gratifying.

High-Class Liners on Hand.—The tonnage of high-class liners on the stocks or on the books of Clyde shipbuilders, is at present exceptionally large, and without, meantime, dealing with the warship tonnage—also satisfactorily large—it may be interesting simply to touch on the mercantile vessels of outstanding importance. Leading off in this respect is, of course, the Cunard liner *Aquitania*, at Clydebank. The double bottom of this latest leviathan is now practically complete, and the framing about the stern is beginning to show among the uprights. Next in interest perhaps, are the four large liners for the Canadian service; two C.P.R. vessels at Fairfield, and the two fine Allan liners one at Fairfield and one at Dalmuir. At Clydebank, a Union Steamship Co., of New Zealand, liner; and at Dalmuir two large vessels for the Adelaide Steamship Co. At Linthouse two huge and finely-equipped liners for the South American service of the Royal Holland Lloyd, also vessels for the Howard Smith Co. Melbourne, the British India Co. and the Compagnie Belge Maritime du Congo. At the yards of Messrs. Barclay, Curle & Co. and Messrs. Charles Connell & Co. Whiteinch there are in all eleven vessels aggregating 60,000 tons, and at Messrs. Henderson's, Partick, three steamers of about 20,000 tons. In what are known as the lower reaches of the river the yards of Messrs. Caird and Co. and Messrs. Scott & Co. are literally full up with high-class mercantile—where it is not naval tonnage. The first-named have between 50,000 and 60,000 tons under way, or to begin of, for the P. & O. Co. They have on the stocks the *Beltana*, of 11,000 tons, and two others, each of 7,000 tons, while they have still to lay down the keels of two others of the larger size. Messrs. Scott's Co., in addition to the two new Cunarders just ordered, the tonnage of which is as yet uncertain, have other high-class liners—measuring in all about 40,000 tons—including additions to the Holt, Leyland, Donaldson and Booth Lines.

Scott's Shipbuilding and Engineering Co., Greenock, have secured from the British Admiralty the order to build a submersible boat of the "Laurenti" type, this being the first contract of the kind to be placed on the Clyde—all the vessels of the submarine class for the British Navy having hitherto been built either at Barrow-in-Furness or at one of the Royal Dockyards. Submersibles of the "Laurenti" type have been introduced by the Fiat San Giorgio Co., of Spezia, and the Scott Company have acquired the licence for their construction in this country. A feature of the Italian design is the construction of an outer hull so as to give the highest propulsive efficiency, and reserve buoyancy on the surface with the minimum of draught; and an inner hull to minimize the internal cubic capacity while ensuring satisfactory conditions when submerged. The new submersible will be of the twin-screw type with twin six-cylinder Diesel engines in one engine room and electric motors for propelling the vessel when submerged. The torpedo tubes will be forward under the bow, and the storage tubes above. In connection with another naval contract of practical novelty on the Clyde which the Scott Company have on hand—in addition, of course, to the great battleship *Ajax*, the depot ship *Maidstone*, a dispute, culminating in a strike, which has lasted since December, arose between the engineers and the sheet metal workers as to which branch was entitled to the work of making ventilators, casings etc. The engineers claimed that by custom and practice the work was theirs, although being done by the sheet metal workers. While only about 200 engineers were directly involved in the dispute, the other engineers employed by the Company, numbering nearly 700, came out in sympathy. Following upon a provisional agreement come to in conference between the Employers' Federation and the officials of the Amalgamated Society of Engineers, the engineers decided by a majority to accept the terms offered, and on Monday the 22nd resumed operations. The terms stipulated that the work in dispute on the depot-ship *Maidstone* should be finished by the sheet workers, but all the same class of work on the *Ajax* should be overtaken by the engineers.

Messrs. Yarrow & Co., Scotstoun, have just put through her official speed trials the torpedo-destroyer *Archer*, one of the five special vessels of this class under construction at their works for the British Admiralty. The trials were conducted on and about the Clyde measured mile at Skelmorlie on January 17th, and although the weather was exceptionally bad a speed of 30·3 knots was attained during a continuous run of eight hours. This exceeded the contract speed of 28 knots by as much as 2·3 knots, and throughout the trial the machinery worked perfectly. Propulsion in this case is by turbines of the Brown-Curtis type, constructed by the builders. Special interest attaches to this vessel's trials because the installation of water-tube boilers is fitted with Yarrow's patent system of superheating. The average superheat during the trial was 94 deg. F., from which a very appreciable gain in economy was obtained. The boiler-making department in the large Yarrow establishment is kept in operation to its highest capacity, and at the present time the firm are preparing designs for the large installations of Yarrow boilers to be fitted into the two latest battleships being built for the Italian Government. Each ship is to be fitted with twenty boilers, and the work of erecting them on board will be carried out by Messrs. Ansaldo, Armstrong and Co., at Genoa. These are the first large Yarrow installations adopted by the Italian authorities, and the preference for them is due to their success in other vessels.

Messrs. Babcock & Wilcox, whose extensive works for the manufacture of water-tube boilers at Renfrew are very fully requisitioned, are reported to have secured a controlling interest in a new Company which is about to restart the weldless tube milling section of the huge "Kosmoid" concern laid down some years ago on the Dumbuck estate on the north side of the Clyde near Dumbarton for the manufacture on a large scale of a number of specialities in engineering, but which has ever since only been very partially in operation. The tube-mill section has never had satisfactory opportunity of demonstrating the possibilities of its existence. The machinery installed is of a novel pattern, and the tubes are drawn in the solid, straight from the ingot, without joint or weld of any kind. In the new start about to be made it is believed the Babcock & Wilcox Co. will really direct operations, and as in the course of a year's output of their well-known water-tube boiler they consume a vast quantity of tubes, the Renfrew demand alone—if it can be met by the works at Dumbarton—is likely to afford a promising field for brisk effort.

Messrs. Wm. Hamilton & Co., Port Glasgow, are to build a steamer of 8,500 tons carrying capacity for Liverpool owners, construction to be on the Isherwood longitudinal system. The vessel is to be 420 ft. long, and machinery, designed to give a speed of about 12 knots, will be supplied by Messrs. David Rowan & Co., Glasgow.

The Shipyard in the East Bay, Port Glasgow, hitherto [illegible] Messrs. Anderson, Rodger & Co., has [illegible] of Mr. Rodger, a few years ago [illegible] and at the present time [illegible] work. Although [illegible] in connection with the partial tenancy [illegible] firm's workmen and yard workshops. [illegible] resume full operations [illegible] yard affords employment to about 1,500 workmen of all [illegible] Messrs. Rodger & Co., under the management of Mr. E. Hall-Brown, [illegible]

Messrs. Robert Duncan & Co., Port Glasgow, have received [illegible] Messrs. Long & Eaton, Greenock, [illegible] cutting capacity.

Government Works Extensions.—Good news for the industrial classes of both the Clyde and the Forth Valley [illegible] in the Navy [illegible] Works at [illegible] Rosyth Dockyard. It is believed now that in the Estimates the sum of £300,000 will be asked for the [illegible] the submarine basin extensions [illegible] of a coaling station.

Heavy Turning Lathe.—Messrs. Shanks & Co., [illegible] preparing to construct a turning lathe of very heavy [illegible] of gun making, and is [illegible] of Scotland gun makers.

Messrs. The Ailsa Shipbuilding Co., of Troon, on the Ayrshire [illegible] already on hand three steamers for the same [illegible] Brazil, [illegible] and the machinery being supplied by the Ailsa [illegible] of these operations. [illegible] of [illegible]

Work in Hand on East Coast.—Taken all over the amount [illegible] contracts for as many as fifteen trawlers, and about [illegible] for a small cargo and passenger [illegible]

Messrs. Mackay Brothers, [illegible] of them being [illegible]

TYNESIDE AND WEARSIDE.

(From our Own Correspondent.)

THE [illegible] for a forty-[illegible]

THE TEES AND HARTLEPOOLS.

(From our Own Correspondent.)

Middlesbrough.

Messrs. Sir Raylton Dixon & Co., Cleveland Dock, [illegible] Messrs. Furness, Withy & Co. [illegible] Hartlepool, instead of the Diesel oil engine [illegible] Messrs. Richardsons, Westgarth & Co., Middlesbrough [illegible]

Messrs. W. Harkess & Co., Ltd., are expecting to book an [illegible] steamer which is in the market, and are [illegible]

Messrs. Smith's Dry Dock Co., South Bank, continue to [illegible] i.h.p.

Messrs. Richardsons, Westgarth & Co. [illegible] Messrs. Sir Raylton Dixon & Co. It is reported that the new [illegible]

[illegible] Wilton, Aytoun.

[illegible]

Stockton and Thornaby.

Messrs. Craig, Taylor & Co. [illegible]

Messrs. R. Ropner & Son are fairly busy and are reported as having secured the contract to build a medium sized cargo steamer for foreign owners.

Messrs. Richardson, Duck & Co. continue very busy. They are reported as having sold a large 8,[illegible] ton deadweight steamer built for Cardiff owners with Messrs. Blair and Co.'s engine and boilers of about 2,000 i.h.p., for about £[illegible].

Messrs. Blair & Co. are said to be booked up into next year but, like other engineers, are being handicapped for delivery of material from the mills.

West Hartlepool.

Messrs. W. Gray & Co., Ltd., are very full of work; amongst the new orders are two 8,[illegible] ton deadweight steamers for Messrs. Strick, Cardiff, who have recently sold a sister ship of [illegible] knots speed to Messrs. Ruys & Zonen Rotterdam for about £[illegible].

Messrs. Irvine's Shipbuilding and Dry Dock Co., Ltd., Harbour Dockyard continue very busy on both new and old work. They are reported as having secured the contract to build a cargo steamer, a sister ship to one recently launched for Messrs. Milburne & Lund, Whitby and West Hartlepool.

The Central Marine Engine Works of Messrs. W. Gray and Co. continue very busy. They are to construct the engine and boilers for Messrs. Strick's steamers, and are reported as having a large repair contract to start on. They are well booked up through this year.

The s.s. *Marian*, 1936 gross tons, belonging to the Tuchmann Steamship Company, is reported as sold to foreigners through Messrs. Gillespie & Nicol, Glasgow, for about £[illegible].

Hartlepool.

Messrs. Irvine's Shipbuilding and Dry Dock Co., Middleton yard, have had a very good year and are still very busy. Amongst the new contracts are two steamers of about 10,000 tons deadweight each for Messrs. The Koninklijke Hollandsche Lloyds, one of their old customers. They are reported as having secured a contract to build a cargo steamer similar to one recently launched for Messrs. Houlder Bros. They are also busy on old and dry dock work.

Messrs. Richardsons, Westgarth & Co., Ltd., continue to be very busy. They have secured the contracts to supply all the machinery for the steamers to be built at both of Messrs. Irvine & Co.'s Middleton and Harbour Dockyards, and now have four sets of large quadruple-expansion engines on hand, one set being for Messrs. Howard Smith & Co.'s steamer building at Middlesbrough, and two sets for the Holland Amerika Line, of about [illegible] i.h.p. With the large amount of work on hand a good year may be expected, all the various departments are very busy, there being a large demand for the contraflo condenser system.

THE HUMBER AND DISTRICT.

(*From our Own Correspondent.*)

New Petroleum Stores at Hull.—The Asiatic Petroleum Co., Ltd., are in negotiation with the Hull Corporation to lease some land to build tanks between Earle's Shipbuilding Yard and Alexandra Dock. The steamers would be able to come alongside the quay in the river and discharge their cargo right into the tanks and bunker without coming into docks, and proceed to sea again, which would be a great saving in time and money.

Hull Joint Docks.—The new docks to the east of the city are progressing rapidly. They will belong to the North-Eastern Railway Company and the Hull and Barnsley Railway Company, owners of the Alexandra Dock, one of the finest docks in England. The new docks will have the best machinery for discharging and loading of coal, grain and general cargoes, and will be fitted up with the finest of warehouses. The Company are now building two large graving docks.

River Improvement.—The Humber Conservancy Board are considering the river improvement scheme, and it is reported that they are of opinion that Sir J. P. Griffith (engineer to the Dublin Port and Dock Boards) and Mr. A. G. Lyster, engineer to the Mersey Docks and Harbour Board, should be invited to prepare a joint report, and that when their report is concluded it should be submitted to Sir Wm. Matthews.

Shipping Facilities on the Humber.—The Admiralty are seeking power to construct a pier or jetty on the river Humber near Killingholme, and the new Immingham Docks, the breadth of the pier to be [illegible] ft., the length of the head [illegible] ft. and the breadth of the head 20 to 30 ft. The Admiralty also seek power to deepen, dredge, scour, cleanse, alter and improve from time to time the bed, shores and channels of the river Humber adjoining or near to the proposed pier.

Messrs. Hull Central Dry Dock and Engineering Co., Ltd., have been so busy during the month that they had to engage the Alexandra Graving Docks. Work has been done on the following steamers:—S.s. *Weathier*, s.s. *Farham*, s.s. *Dot*, s.s. *Croshill*, s.s. *Herm*, s.s. *Rescue*, s.s. *Corinthie*, s.s. *Airmyn*, s.s. *Majestic*, sailing ship *Lord Shaftesbury*, s.s. *Cairntorr*, s.s. *Khorazan*, s.s. *Hurstdale*, s.s. *Olympic*, s.s. *Emanuel*, s.s. *Dalewood*, s.s. *Frank Coverdale*, s.s. *Skill*, s.s. *Adalands*, s.s. *Deddington*, s.s. *Muriel Coverdale*, s.s. *Myrtoon*, s.s. *Camberwell*, s.s. *Dalhanna*. Several of the above steamers have undergone survey by Lloyds', and British Corporation surveys.

Messrs. North-East Coast Engineering Works, Ltd., have had a fair month on the following steamers:—S.s. *King Malcolm*, s.s. *Saltwell*, s.s. *Riverton*, s.s. *Tiverton*, s.s. *Fox* and the s.s. *Ambassador*. These steamers have undergone general repairs. The *Saltwell* has been opened out for Lloyd's survey. The Company's branch works at Goole are nearly finished, and the machinery will soon be fitted up. They have the promise of repair work from several Goole ship owners.

Messrs. Amos & Smith, engineers and boilermakers, are still receiving orders for boilers and machinery for new trawlers building locally. They have a great number of orders to execute during the current year, and in consequence the machines in the engine works are kept up to their load night and day. The outside staff are kept fully employed with repair work for local and outside owners. The branch shop at Alexandra Dock is also kept at full working pressure with graving-dock work, etc.

Messrs. Stewart & Craig, engineers and boilermakers, have been exceedingly busy during the month. The s.s. *Helvetia* has undergone extensive alterations and general repair work, also the French sailing ship *Brizeux*, repairs to donkey boiler, uptake, etc., and other general repairs; s.s. *Annie Therse*, renewing and repairing several plates in the hull, etc.; s.s. *Dowlais*, extensive deck repairs rendered necessary by the late heavy weather. Repairs on the following vessels: s.s. *Stella*, s.s. *Ring*, s.s. *Leroussio*, s.s. *Adjutant*, s.s. *Algol*, s.s. *Beyenlus*, s.s. *Aldebermon*, s.s. *Teal*, s.s. *Finland Trader*, and extensive repairs to steam dredger *Precursor* have also been effected.

Thomas Tate, engineer and boilermaker, has had repairs on the following steamers:—s.s. *Orran Tudor*, s.s. *Ralph Creyke* and several local tug boats and steam keels.

Messrs. Cochrane & Son, shipbuilders, Selby, are still building and launching trawlers for local owners, etc., and are well booked ahead for the year. They launched on the 6th ult. the second order for the Mount Steam Fishing Co., Ltd., Fleetwood, a handsome trawler of the following dimensions—130 ft. by 23 ft. 6 in. by 13 ft. 3 in. moulded. Powerful triple engines and boiler by C. D. Holmes, Ltd., of Hull. The trawler was named *Davara* by Mrs. N. Pilling, of Blackpool.

Messrs. Cooper & Co., Ltd., engineers and shipbuilders, have had an exceedingly busy month with general overhauling and graving-dock work, and have had to engage the railway company's graving docks for large vessels. The s.s. *Dee* has had very extensive repairs effected, s.s. *Potaro* general repairs and insulation of holds; s.s. *Odessa* is undergoing heavy repairs in the graving dock and Board of Trade survey; s.s. *Monica* extensive repairs to main boilers and other deck and engine-room repairs. The branch shop at Alexandra Dock has had a very good month in general repairs and opening out for surveys, etc. The firm's own graving dock has had an excellent month with coasting steamers, and the dock is well booked up ahead. The moulding department is now well booked up with orders for new propellers for home and foreign orders.

The Wilson Line and Earle's Shipbuilding Co., Ltd.—We understand the Wilson Line has placed with Earle's Shipbuilding Co., Ltd., three new vessels to construct of 3,600 tons deadweight for the Mediterranean and Baltic trades (cargo

only, also two smaller steamers for the Stockholm trade of about 1000 deadweight cargo. The vessels will be constructed to the British Corporation rules. The Wilson Line has bought a steamer of about 3,100 tons deadweight now on the stocks building at the Clyde Shipbuilding Co. The vessel has been purchased from Messrs. Stott & Co., Liverpool, who were having the ship built for themselves. Messrs. Dunlop & Bremner & Co., Ltd., of Port Glasgow, have also secured an order to build a steamer for the Wilson Line of about 3700 tons deadweight for the Mediterranean and Baltic trades, similar to three new vessels Earle's Company are building. These steamers will each be fitted with a sufficient number of steam winches for the rapid loading and unloading of general cargoes.

Obituary. We regret to have to report the death of the following sea-going engineers: Mr. J. Patrinson, aged 72, chief engineer in various steamers of the Wilson Line, who was connected with the firm for about [illegible] years; and Mr. George Harrison, aged 60, late chief engineer s.s. *Austria*, Wilson Line. Mr. Harrison was engineer of this steamer for many years, when owned by the late firm of Messrs. Bailey & Leetham, and came to the Wilson Line when they bought up the fleet. The deceased was at one time manager of the Vulcan Ironworks.

SOUTH OF ENGLAND AND ISLE OF WIGHT.

(From our Own Correspondent.)

Dock Developments at Southampton.—It is now definitely announced that the negotiations between Mr. T. Chamberlayne and the London and South-Western Railway Company for the purchase of the whole of the Weston foreshore have been brought to a definite conclusion. The whole area embraces about 400 acres and extends from the Itchen Sewerage Works to the grounds of Netley Castle, including a large portion of the Weston Grove estate. This new area will be connected to the main Netley and Fareham lines by means of branch lines commencing on the Netley shore, and terminating on the Netley line near Sholing Station. Part of this area was the subject of arbitration proceedings as far back as November, 1909, the award being made in February, 1910, the area then amounting to about 180 acres. The purchase of this portion has since been completed, and it is understood that the purchase of the remainder of about 220 acres will also shortly be completed, when extensive and important developments are expected.

Labour Trouble.—About 1000 men were idle at the beginning of last month due to a labourers' strike at the yards of Messrs. J. Samuel White & Co., East and West Cowes, the men demanding an increase of pay. In consequence of the strike the platers and riveters also ceased work.

Messrs. Harland & Wolff.—The s.s. *Dunkeld*, owners The British and North Atlantic Steam Navigation Co., is now in the hands of Messrs. Harland & Wolff at Southampton, undergoing an extensive overhaul, and it is stated that she is to be converted from a cargo steamer into a first-class passenger vessel for the Company's Australian service. This will mean a very big job and will give employment to a large number of hands for some considerable time. It is understood that the work was to have been executed at Belfast, but owing to the great pressure there it has been transferred to Southampton. The *Dunkeld* is a twin-screw steamer and was built by Messrs. Harland and Wolff in 1890. She is 5[illegible] ft. long with a beam of 62.4 ft.

Messrs. J. Samuel White & Co., Ltd., East Cowes, I. of W. The revenue cutter *[illegible]* arrived safely at Havana last month. H.M.S. *Forester* has completed successful trials and was handed over to the authorities. Also several launches were delivered to Portsmouth and Devonport dockyards during January. The framing of the first Chilian destroyer is now completed, and work is plentiful in all department.

Messrs. Day, Summers & Co., Ltd., Northam Ironworks, Southampton.—The yard have received an order from Mr. Frank Bibby to build a twin-screw steel yacht of 75[illegible] tons to his order. The yacht is to be [illegible] as is his present one. She has been designed by the firm to meet Mr. Bibby's special requirements, and will be fitted with continuous deck house fore and aft with a flying bridge at the fore end. The steam yacht *Cutty Sark* ([illegible] tons), owned by the Duke of Sutherland, has had a new tail shaft fitted and completed her survey and is now fitting out for a spring cruise. The s.s. *Medina* and s.s. *Solent* are also fitting out at the yard. The 7[illegible]-ton tugs screw tug which the firm are building for Messrs. Dredge was launched on the 26th of January, and the large cattle barge for the same owners is well advanced. A new boiler is being constructed for one of the Isle of Wight Co.'s steamers, and new windlasses will be fitted to the p.s. *Queen* similar to those fitted in the *Princess May* recently built by the firm for this company. The s.s. *Sofia* [illegible] tons, owners Eastern Navigation Co., Ltd., which stranded, very damaged, about Christmas, has been repaired and left the yard last month. This vessel was brought round to Southampton from Falmouth, which is a new departure as previously damaged vessels from that port have gone into the Bristol Channel. The owners were very pleased with the way in which the repairs were executed, and doubtless this may influence other owners of damaged vessels from Falmouth to come here in future. The firm are also busy with H.M.S. *Spanker*, which is undergoing her annual overhaul in the docks. They have also completed repairs to the twin screw tug *Hector* and to the p.s. *Bonnie Dale*.

Messrs. Simpson, Strickland & Co., Ltd., Dartmouth.—Last month work at this establishment was fairly plentiful. two 30 ft. steam launches were delivered to Liverpool to the order of the American Line, also a 23 ft. steel motor launch with a 8-b.h.p. petrol motor of the firm's make was despatched to South America. A double-skinned teak launch with C.S.C. engine and direct tube boiler was despatched for shipment to the West Coast of South America, the boat being a duplicate of one sent to the same destination a few years ago. Orders in hand include a 28 ft. mahogany yacht's launch to be fitted with a Kingdon quadruple engine, and oil fired boiler; a 27 ft. teak launch with similar machinery for the Marquis of Downshire for sea fishing off the Irish coast; a 30 ft. steel steam launch for the Danube and a [illegible] ft. double skin teak launch and machinery for a Clyde firm of shipbuilders. There is a fair amount of repair work in hand and several sets of machinery and boilers in addition to those mentioned above.

Messrs. J. I. Thornycroft & Co., Ltd., Southampton.—Good progress is being made with H.M.S. *Hardy*, the special destroyer which the firm have been commissioned to build. The four torpedo-boat destroyers provisionally ordered are to receive the following names—H.M.S.'s *Paragon*, *Porpoise*, *Unity* and *Victor*. H.M. paddle tugs *Sturdy* and *Strenuous* are making good progress, and are now in frame. The firm have received a repeat order from the Crown Agents for the Colonies for a [illegible]-ton steel lighter, which is now rapidly nearing completion. A [illegible] ft. motor launch was also put through her trials last month. The general work at the yard has made good progress during the month, and the repairs department has been well occupied upon troopships, yachts and dockyard craft.

THAMES.

(From our Own Correspondent.)

Admiralty Work.—Matters in this direction have been very strenuously pushed during the month. The workmen concerned have had a meeting in Trafalgar Square to press forward the claim of the Thames to consideration by the Admiralty, and Mr. Arnold Hills, the chairman of the Shipbuilding Company, was the centre of the large gathering as he spoke from his invalid couch. Five resolutions were put to the meeting and carried that the Thames should have consideration and asking for the appointment of a Royal Commission on the subject and urging the importance of the Thames in time of war as a shipbuilding centre. The Government has been pressed for contracts to be placed with the Receiver of the company but declined to agree to this proposal. [illegible] Northam [illegible] to a reduction of wages or an increase of working hours. The Admiralty [illegible] the placing of a contract [illegible] and [illegible] with an offer to take over the [illegible] company on condition that the Admiralty place this order [illegible] the old rate of wages [illegible] the [illegible] of November last, and if the men agree [illegible]

reduction there is at least a prospect of the orders being placed, the tenders being thus left in consequence. The only regret seems to be with such a movement the departure of Mr. Hills, who has been the centre of such activity in this direction for so many years but if, as is to be hoped, the negotiations are successful it will be to the workers' gain and that of the port as a whole.

Shipping Companies.—In this department there has also been great activity financially. The Union Castle Company has been acquired by the Royal Mail Steamship Company combination. The price paid aggregates a total of £5,300,833, while the fleet acquired is fifty steamers of 320,000 tons. With Messrs. Elder, Dempster in the West African trade the new concern will command the African trade entirely and be the largest in the world. The mail contract to South Africa has no doubt had a great deal to do with this great purchase and we may probably have developments in this direction shortly. The price of the Union Castle shares sold for £32 10s., was quite recently only 14½ on the market, and at the last went up to 28.

Another amalgamation is that of the New Zealand Company and the Federal Co. The former company owns eighteen steamers of 143,000 tons and the latter eleven steamers of 83,000 tons. The larger company has been, as its name implies, in the New Zealand trade and the smaller engaged in the Australian. In each case the companies own some boats of over 11,000 tons each.

The P. and O. Company are building a new vessel to be called *Beralla*, which will be engaged in the Australian service *via* the Cape, and be similar to the *Ballarat*, of 11,000 tons.

Port of London and Rates.—The proposal to build a new dock to the South of the Royal Albert Docks at a cost of £2,500,000, is assuming shape. The length of the dock will be 4600 ft. and the width from 700 ft. at the eastern to 500 ft. at the western end, the area being 65 acres and the depth of water 38 ft. Further provision is being made for a new quay at Tilbury and an extension of the East India Docks. The railway and canal commission are holding an enquiry as to the rates for goods to the docks charged by the railway companies, the Port of London Authority desiring a through rate by the Midland, Great Eastern and the Tottenham and Hampstead lines on the ground that trade is hampered by there being no such through rate at present. The enquiry is still proceeding.

MERSEY AND MANCHESTER SHIP CANAL.

(From our Own Correspondent.)

IN a recent issue we noted the increasing tendency of shipbuilders to place orders for large tonnage locally. An order for a second Atlantic liner has since been placed by the new Norwegian Line. Birkenhead has also shown its enterprise by forming a Chamber of Commerce.

Messrs. Cammell, Laird & Co.—Everything points to still greater activity in this firm's many departments, the recent Admiralty orders being now followed by further mercantile work. A second Atlantic liner for the Norske Americalinje Co., of Christiania, has been ordered from Messrs. Cammell, Laird & Co., being a repeat of the first vessel. Work is being pushed forward on the various large Admiralty contracts. Good progress is being made with the first Norwegian liner laid down at Tranmere. The L. & N.W.Rly. steamer *Greenore* will shortly be ready for launching. The tug *Westbourne*, for the Port of London, has left for London after a successful trial to take up her duties, which will consist of towing and the laying of moorings, etc. The destroyer *Lapwing* returned from the Clyde on January 13th after successful speed and other trials, and is now preparing for commission. H.M.S. *Alecto*, the second tender to submarine depot ship, is now undergoing trials. H.M.S. *Adamant* is now having her finishing touches prior to leaving for Portsmouth. The four destroyers for the Argentine Government are now receiving their torpedo and gun armament. The same Government's transport, *Chaco*, has undergone repairs to tail shaft. The Midland Rly. Co.'s steamer *City of Belfast* has left for Heysham after being re-boilered, and on the way underwent her speed trials, when excellent results were obtained. The Johnston liner *Edenmore* and the P. Henderson steamer *Chindwin* have left after repairs. The luggage ferry steamer *Tranmere* has left dock after extensive repairs, and has gone on service again. In Liverpool Docks, this firm are also carrying out painting and survey work upon the Pacific liner *Orissa*. Early in January several sets of steel barge frames were shipped to Colombo, there to be built up with teakwood.

Messrs. H. & C. Grayson.—Amongst the many contracts in hand by this firm may be mentioned the extensive repairs to the *Mauretania* in the Canada Dock. Some fifty plates have been removed and a large staff of men are engaged, the work being pushed rapidly on, and it is expected that she will not be in dock much longer than for her usual survey. In the Langton Dock the *Lake Champlain* is having extensive stern and bottom damage repairs due to grounding in the St. Lawrence. In the Clarence Dock, the Great Western Railway steamer *Lynx* is being re-boilered and extensive repairs carried out. At their Birkenhead works, the *Hornby* and *Gartshore* have had repairs. A work of special interest being carried out at the Birkenhead Works is the lengthening of a vessel by cutting and building in 30 feet. At their Garston Works the steamers *Inga* and *Inchmore* have been under repair.

Messrs. Clover, Clayton & Co.—This firm, with their improved plant at Birkenhead, have had a very busy time with repair work. The Brocklebank steamer *Matheran* has been dry-docked in the West Float Graving Dock for repairs. The Manchester steam hopper *Joseph Thompson* has had new shafts fitted and other repairs. The dredger *Gilbertson* has been brought from Barrow for repairs. Other repair-work in hand includes the ferry-steamer *Wirral*, the *M. E. Hall*, and the G.W.Rly. steamer *Atalanta*.

The Isle of Man Steam Packet Co.—This Company, it is reported, are in the market for a new steamer of large dimensions for cross-Channel work. Oil-fuel will be considered in the designs, it is understood. At present the largest vessel of the fleet is the *Ben-My-Chree*, of 2,700 tons, which vessel has a speed of 24 knots at sea and a horse-power of 13,000.

The Manchester Dry Dock Co.—This Company held its twentieth annual meeting at Newcastle on December 27th. Mr. Renwick, presiding, said the profits were £15,953. A dividend of 5 per cent. was proposed to be paid on the ordinary shares.

Birkenhead Chamber of Commerce.—A meeting of the Mayor and Councillors was recently held to discuss the matters in connection with the Chamber of Commerce, which is nearing completion. Several projects were mentioned for improving the transport facilities. A road tunnel under the Mersey was deemed impossible, due to the long approach required. Free lighterage across the river was also proposed. The policy of the Dock Board has been often criticized for its preferential treatment of Liverpool. It was pointed out that the quayage at Birkenhead was sufficient for the existing demands, but that greater railway facilities were what was required. A bridge from Ilchester Wharf to Poulton was also suggested. With this and the improved railway facilities, Birkenhead should be a finer distributing centre than Liverpool. What is needed is, perhaps, greater public spirit on behalf of the leading citizens to complete the dream of the far-sighted founders of this well-planned city. To this end the new Chamber of Commerce is expected to lend its influence.

Cunard Line. An order has been placed by the Cunard Co. with Messrs. Scott's Shipbuilding and Engineering Co., Greenock, for two steamers for the Canadian Atlantic trade. As regards design, the vessels will be between the *Ascania* and the *Laconia*. But for the early delivery promised by the northern firm, this order might have been placed locally.

NORTH-WEST OF ENGLAND.

(From our Own Correspondent.)

Barrow.—Never in the history of the shipbuilding trade was there so much briskness and activity as there is being experienced at present at Barrow. The Vickers Company are thronged with work in every department and there

is a rush with certain orders which are on the stocks in order to make room for other ships to go down on the slipways and this position is now so marked that the firm are making arrangements to extend their launching ways so as to be able to put down two vessels at one time. With this view the submarine shed is to be removed on to new land recently acquired from the Furness Railway Co. on which site all the smaller vessels to be built will be laid down. The great Montreal floating dock is occupying a deal of room in the yard, and is at any rate keeping possession of two slipways on which the Company could put down new ships were the floating dock launched. The tendency of things at Barrow is to increase the capacity of Messrs. Vickers' yard, not only in the shipbuilding but engineering departments. At present overtime is being worked in all branches except that of the boiler makers and the block squad generally. The firm wanted these men to put in overtime so as to ensure the early launching of the Japanese battle cruiser *Kongo*, but the men decided by ballot by a large majority not to oblige the firm in this way, as a means of showing their feeling against the action of their employers on the occasion of the recent boiler-makers' lock-out. This action will seriously interfere with the output of work in connection with, at any rate, the Japanese warship *Kongo*. It is to be regretted also from the point of view of the highly probable new business which has lately been coming to fruition. The firm may possibly get over the difficulty in some other way, as it is absolutely essential the *Kongo* must be launched at the early high tide in April, and there is much to do before the event can take place. One thing is certain as a result of the new rush of work, and that is that more permanent slipways are found to be necessary in the Vickers' yard at Barrow. The firm have already one permanent slipway already built up on piles on a very hard bottom, on which a vessel could be built [illegible] long and of any weight, but up to now this slipway has not been provided with overhead cranes. It will not be surprising if the firm at once give out the contract for this work while at the same time giving out orders for one or two other slipways to be made ready for the heaviest vessels. There never was a time when big warships were in such great demand as at present, as well for the Home Government as for foreign Powers, and certainly a busy time is ahead of local shipbuilders for very many years to come. Some years ago the firm bought all the land between their present works and the Walney Bridge, which spans Walney Channel. This, it is anticipated, will be fully utilized by the extension of the shipbuilding department.

H.M.S. "Princess Royal."—The firm are putting all their energies into the work of completing the battle cruiser *Princess Royal* by the end of March, with which object they have a double shift working on the vessel. Her engines and boilers are already fixed in the ship, and before long she will begin her dock trials. Two of her turrets are fixed in their places and the third will be erected during February. Her gun turrets are in a forward state and will soon be completed. Dredging operations have been proceeding in Walney Channel in order to give plenty of depth and width for the manœuvring of the vessel when she leaves the dock. A deep water channel 600 ft. long has been dredged out in which any vessel of [illegible] ft. long can be safely at low water in [illegible] ft. of water. This work has been done with a clear object of enabling vessels to be berthed for alterations, repairs, without taking them into the docks, and also with the idea of being able to build vessels of any size, and of a width of more than 100 ft., which is the width of the entrance to the locks.

H.M.S. "Phœnix."—This torpedo boat-destroyer, which is to burn oil fuel only, is being fitted up at the Devonshire Dock wharf, and will soon be ready to take her trials. Several submarines are also being completed in the Devonshire Dock and others of the "E" class for the British Navy are being built in the submarine shed.

The Turkish Battleship.—Very marked progress has already been made in the initial construction of the Turkish battleship *Reshad V*, and quite a large contingent of Turkish gentlemen are to be seen at present daily in connection with this vessel and in other shipbuilding connections in the yard. The *Reshad V* will be built as rapidly as possible, as her place on the dock is required for another vessel, which is to be built at Barrow but [illegible] official information is at present withheld by the firm.

New Orders.—It is reported on very good authority that the order for three Brazilian river gunboats has been placed with Messrs. Vickers, Limited, but no official information is available.

Scarcity of Men.—There is still a great scarcity of labour, workmen in the shipbuilding and engineering departments, and the difficulty of getting men is such the greater because every shipbuilding yard in the country is very busy and under such conditions men are loth to leave one job and go to another. Shipbuilding and engineering operations are so brisk in Barrow that the demand for new houses is seen very great, and builders are as busy as they can be in trying to supply the want.

Engineering. The battleship cruiser *Lion*, which went through her trials so successfully in the English Channel, was engined by Messrs. Vickers Ltd. She attained a trial speed of 31·7 knots, although she was only designed for 28 knots. The credit for this achievement goes to the Barrow firm. The *Princess Royal* is a sister ship and she is expected to achieve equally satisfactory results in April next.

Shipping. Shipping remains quiet, but there is more metal (iron and steel) being exported than during last year.

BELFAST.

(From our Own Correspondent.)

Messrs. Harland & Wolff.—At the present time the Queen's Island firm have five new vessels at the fitting-out wharves, having an aggregate of 80,500 gross tonnage. These are the White Star liner *Laurentic*, the *Devanha*, the *Donnera* and the *Arlanza* for the Royal Mail Steam Packet Company; also the new cross-Channel steamer *Patriotic*, which is the latest addition to the Belfast Steamship Company's fleet. They have still another sister ship of the *Devanha* and *Donnera* to launch. These three steamers are big intermediate boats having extensive cargo capacity, together with accommodation for a good number of passengers, while the *Arlanza* is a triple screw mail and passenger steamer. Rapid progress has been made with the fitting out of the White Star leviathan, all her machinery and boilers having been put on board, and all four funnels slipped in their places. Messrs. Harland & Wolff have the White Star tender *Magic* and the Brocklebank liner *Mulbera* in hand for overhaul and repairs. The magnificent new heavy machine and erecting shop—an outline description of which was given in a recent issue of *The Marine Engineer*—has been equipped with the latest and most up-to-date types of machine tools, and the vast sums of money that are being sunk in various other departments of the shipyard and engine works are a clear indication of the firm's determination to keep thoroughly abreast of the times in every respect. The report that they are in negotiation with the Mersey Dock Board for a site on which to erect a repairing establishment in Liverpool comes not altogether as a matter of surprise to me with Lord Pirrie's ever-increasing interest in shipping—a big proportion of which comes regularly into the Mersey—such a development of Messrs. Harland & Wolff's business is quite natural. Whether or not it is to be worked in combination with the principal repairing firms on the Mersey—with the exception of Messrs. Cammell Laird—has been uncovered remains to be seen.

Messrs. Workman, Clark & Co.—Before these notes are in print Messrs. Workman, Clark & Co. will have completed their output of new tonnage for the year by the launch of a large steamer from their north yard. Another vessel of big dimensions in the south yard is also nearly ready for launching. The Harbour Board proposes to erect at a cost of £5000, two wharves for fitting-out purposes adjoining the new ground acquired by this firm some time since, as an extension of their north yard. This will be a great convenience, for, [illegible] put in the [illegible] from the Railway yards there is at present little enough berthing space.

Institute of Marine Engineers.—The London district general meeting was held on the 16th and 17th January, several important papers were read at the meeting. The principal address by Prof. Wm. Goodall was on [illegible] Copper and its alloys, [illegible]

LAUNCHES AND TRIAL TRIPS.

LAUNCHES English.

Ruysdael. On November 21st Messrs William Gray & Co Ltd launched the handsome steel screw steamer *Ruysdael* for The Pelton Steam Shipping Co Ltd. London She will take the highest class in Lloyd's Register, and is of the following dimensions Length overall 354 ft 6 in., breadth, 49 ft.; and depth, 25 ft. 5 in., with long bridge, poop and topgallant forecastle. The saloon, state-rooms captain's officers' and engineers' rooms etc., will be fitted up in houses on the bridge deck and the crew's berths in the forecastle The hull is built with deep bulb angle frames, dispensing with hold beams and leaving large clear holds, cellular double bottom and large fore-peak and after-peak ballast tanks eight steam winches steam-steering gear amidships, hand screw gear aft patent direct steam windlass, large horizontal multitubular donkey boiler, shifting boards throughout, boats on deck overhead, stockless anchors, telescopic masts with fore and aft rig and all requirements for a first class cargo steamer. Triple-expansion engines are being supplied by The Central Marine Engine Works of the builders, having cylinders 24½ in., 40 in. and 65 in. diameter with a piston stroke of 42 in., and two large steel boilers for a working pressure of 180 lbs. per square inch. The trial trip was run on January 3rd After a few preliminary manœuvres the vessel was taken to the Tyne to load, her performance on the passage being quite satisfactory

Tempo.—On November 21st, there was launched from the shipbuilding and repairing establishment of Messrs. S. P. Austin & Son Ltd., the steel screw steamer *Tempo*, of 1,800 tons deadweight capacity, classed 100 A1 in Lloyd's Register, which has been built to the order of Messrs. R. S. Gardiner and Joseph Reay, of the Pelton Steamship Co., Ltd., Newcastle and London; she is the fifth vessel constructed for the same owners. The vessel will have exceptionally large water-ballast capacity, and is specially adapted for quick loading and discharging, to meet the owners' requirements for the coal trade, and she will be one of the fastest colliers on the coast. Accommodation for the captain is provided in house on bridge deck, officers and engineers in after-end of bridge, and crew in forecastle. Steam windlass by Messrs. Emerson, Walker & Thompson Bros., Ltd.; steam winches by Messrs. George Robson, Ltd.; steam-steering gear by Messrs. Donkin and Co., and these will be driven by a large Cochran vertical multitubular donkey boiler. The machinery of large power will be supplied by Messrs. George Clark, Ltd., of Sunderland.

Clan Macrae.—On November 21st, Messrs. Wm. Doxford and Sons, Ltd., launched from the yard at Pallion, Sunderland, a large 'tween-deck vessel with complete shelter-deck, built to the order of The Clan Line Steamers, Ltd. (Messrs. Cayzer, Irvine & Co., Ltd.), Glasgow, for whom Messrs. Doxford have also a sister vessel now in hand. The dimensions are:—Length, 445 ft., breadth, 53½ ft., moulded depth, 29 ft.; deadweight capacity, 8,500 tons. The engines and boilers are being constructed by Messrs. Doxford. Classification is with the British Corporation. The vessel ran a successful trial trip on January 15th.

Roddam.—On November 21st, there was launched from the yard of the Tyne Iron Shipbuilding Co., Ltd., of Willington Quay-on-Tyne, a steel screw steamer built for The Red "R" Steamship Co., Ltd. (Messrs. Stephens, Sutton and Stephens, managers), Prudential Buildings, Newcastle-on-Tyne, and of the following dimensions, *viz.*:—Length, about 342 ft.; breadth, 47 ft. 6 in.; depth moulded, 25 ft. 7 in., and to class 100 A1 at Lloyd's on the single-deck rule. This vessel has water-ballast fitted right fore and aft on the cellular system, and is also fitted with all modern improvements for the rapid loading and discharging of cargo, including five double cylindered steam winches, direct-acting steam windlass, large multitubular donkey boiler, steam-steering gear by Messrs. Donkin & Co., and screw gear aft. She is also fitted with steel longitudinal grain bulkhead. The engines, which are supplied by Messrs. North-Eastern Marine Engineering Co., Ltd., of Wallsend, are of the triple-expansion type, having cylinders 24 in., 40 in. and 65 in. by 42 in. stroke, with two large single-ended boilers, and working at a pressure of 180 lbs. The trial trip was run on January 13th, when a speed of 10 knots was attained.

Marguerite.—On November 23rd, Messrs. Osbourne, Graham & Co. launched from their yard at Hylton a steel screw steamer *Marguerite*, which is the third vessel they have specially constructed to the order of Fernand Bouet, Esq., of Caen. The vessel is a single-decker 270 ft. by 39 ft. 6 in., built to carry 2,400 tons on a very shallow draught, and is of the self trimming collier type. Arrangements are made for a large amount of water ballast. Rooms for the captain and officers are tastefully fitted out in hardwood, and are of large size. The vessel is fitted with the most modern appliances for economical and quick working of cargo. She has been constructed to Lloyd's highest class and also complies with the requirements of the French law. Machinery has been designed by the North-Eastern Marine Engineering Co., Ltd., Sunderland, to drive the vessel a speed of 10 knots loaded.

Tavian.—On December 4th, Messrs. Richardson, Duck and Co., launched from their yard a steel screw steamer of the following dimensions, *viz.*, Length overall, about 404 ft.; breadth extreme, 52 ft. 6 in.; depth moulded to shelter deck, 35 ft. 8 in., with a deadweight carrying capacity of about 8,350 tons. This vessel, on the "Isherwood" system of construction, has been built to the order of a Cardiff firm, will class 100 A1 in Lloyd's Register, and has been built under special survey. She has two complete decks of steel, *viz.*, shelter and main decks, height between decks being 7 ft. 8 in. There are six extra large hatchways to expedite loading and discharging, the main hatch being 36 ft. by 24 ft. Extra large and roomy accommodation for captain, officers, engineers and apprentices is provided in steel deckhouses on shelter deck, and petty officers and crew are berthed in shelter deck 'tween decks aft. The vessel is fitted with a steel bulwark amidships from fore-end of saloon house to after-end of engineers' side houses. A steel bulwark is also fitted from fore hatch to stem. A cellular double bottom for water-ballast is fitted throughout. The vessel has also peak tanks, and equipment includes six steam winches, derrick tables (forming houses for cargo gear) and cross-trees on masts, four derrick posts, twelve derricks, steam windlass with quick-warping ends, steam-steering gear, stockless anchors, and a good inventory, and outfit. The engines, by Messrs. Blair & Co., Ltd., have cylinders 26 in., 42 in. and 70 in. by 48 in. stroke, steam being supplied by three extra large single-ended boilers having a working pressure of 180 lbs.

Leon y Castillo.—On December 5th, Messrs. W. Harkess and Son, Ltd., launched from their shipbuilding yard at Middlesbrough the finely-modelled passenger and cargo steamer *Leon y Castillo*. Her dimensions are 220 ft. by 29 ft. 10 in. by 12 ft. 3 in., and she is classed 100 A1 at Lloyd's. She is of shelter-deck type, and has promenade and boat decks above, all of teak. Handsome accommodation is provided for a large number of passengers. The vessel will be equipped with the most modern appliances in every department. Engines and boilers capable of driving her a speed of 12 knots will be installed by Messrs. MacColl & Pollock, Ltd., of Sunderland. She is built to the order of Messrs. Elder, Dempster & Co., Ltd., of Liverpool, and is intended for the Inter-Insular mail and passenger service of Grand Canary.

Windsor.—On December 6th, Messrs. Craig, Taylor & Co., Ltd., launched from their Thornaby Shipbuilding Yard, Thornaby-on-Tees, a very fine screw steamer of the following dimensions:—430 ft. by 55 ft. 6 in. by 36 ft. 7½ in. moulded to bridge deck. She is built of steel on the single-deck type, with poop, long bridge, and topgallant forecastle, to Lloyd's highest class, but has in addition to same, increased scantlings to the owner's special requirements. She has large water-ballast capacity in double bottom fore and aft, and in peaks, and is equipped with patent direct steam windlass with quick-warping ends, steam-steering gear, large multitubular donkey boiler, six special steam winches, double derricks, Taylor's all-forged "Dreadnought" stockless anchors, very large hatches, and all the latest improvements for rapid loading and discharging. The masts and funnel have been arranged to suit Manchester Ship Canal requirements; shifting boards are fitted throughout for the carriage of grain cargoes, and all has been arranged to a complete and full specification. The accommodation for captain, spare rooms, and officers, is neatly fitted up in deckhouses amidships on bridge, the engineers being in deckhouses alongside engine casing, and the crew in the poop, with special messrooms, bath-rooms, etc. The whole accommodation has been arranged on a very ample scale, giving each compartment extra large cubic and floor space. Her engines have been

constructed by Messrs. Blair & Co., Ltd., Stockton, the cylinders being 28 in., 46 in., 75 in. by 48 in. stroke with three large boilers working at 180 lbs. pressure. The vessel has been built to the order of Messrs. Evan Thomas Radcliffe and Co., Cardiff, under the superintendence of Captain Hesketh, Mr. Maxwell Hill, and Mr. James. This vessel is a duplicate of the *Hawarden* recently built by Messrs. Craig, Taylor & Co. for the same owners. Messrs. Wailes Dove and Co.'s "Bitumastic" enamels have been applied to the engine and boiler-room tanks, bunkers, etc., and their "Bitumastic" covering to the tank tops.

Ardoyne. On December 7th there was launched from the yard of the Sunderland Shipbuilding Co., Ltd., a handsomely modelled steel screw steamer built to the order of the Adam Steamship Co., Ltd., of Aberdeen, for whom the builders have already constructed a number of ships. The vessel is built on the Isherwood system of longitudinal framing, her principal dimensions being:—Length, 378 ft., breadth, 50 ft. 9 in., and depth moulded 28 ft. 6 in. She is of the single-decker type, with poop, bridge, and forecastle, and will take Lloyd's 100 A1 class under special survey. The deadweight carrying capacity is about 7,400 tons on a light draught. Accommodation for captain, officers and engineers is provided on bridge-deck, the whole being heated by steam. A large saloon in polished hardwood is also fitted in the bridge house. The crew and firemen are accommodated in the forecastle as usual. The deck machinery, which is worked by a large multitubular donkey boiler, consists of eight steam windlasses, by Messrs. Clarke, Chapman and Co., Ltd., steam windlass, and a steam steering gear placed at after end of engine room. Ample provision is made for the quick discharge of cargo, and the holds are almost entirely free from pillars. The main engines are by The North-Eastern Marine Engineering Co., Ltd., Sunderland, and have cylinders 25 in., 42 in. and 68 in. by 45 in. stroke, steam being supplied by two large boilers working at a pressure of 180 lbs. per square inch.

Alnmouth.—On December 7th, there was launched from the yard of Messrs. Cochrane & Sons, Selby, a steel screw trawler, the principal dimensions being 120 ft. by 21 ft. 6 in. by 12 ft. 6 in. moulded. The vessel has been built to the order of The Western Steam Trawling Co., Ltd., Bristol, and will be replete with all the latest improvements for the fishing trade. She will be fitted with powerful triple-expansion engines by Messrs. C. D. Holmes & Co., Ltd., Hull.

New Abbotshall. On December 7th, there was launched at Goole a steel screw cargo steamer of the following dimensions:—Length over all 224 ft. 6 in., beam, 32 ft., and depth moulded, 14 ft. 6 in. The vessel is built to Lloyd's highest class. Triple expansion engines of large power will be fitted, and it is anticipated that the vessel will have a speed of 12 knots. The steamer has been built to the order of Messrs. Stocks, Turnbull & Company, Ltd., of Kirkcaldy, and has been specially designed for their Kirkcaldy and London trade.

Cadmus.—On December 8th, Messrs. Irvine's Shipbuilding and Dry Docks Company, Ltd., launched from their Harbour Dockyard the steel screw steamer *Cadmus*, built to the order of Messrs. John Gaff & Co., Glasgow. The dimensions of the vessel are 285 ft. 6 in. by 43 ft. 2 in. by 25 ft. 7 in. She has a single deck, with poop, bridge and topgallant forecastle, and has been built to the British Corporation Registry's highest class. A double bottom is fitted throughout on the cellular principle, and the after-peak is arranged as a trimming tank. The vessel is constructed with bulb-angle frames and longitudinal stringers, giving clear holds for the stowage of bulky cargoes, four watertight bulkheads are fitted, dividing the steamer into five watertight compartments; there are four large cargo hatches with a steam winch to each; the bulwarks have been specially strengthened for the carriage of deck cargoes, and the vessel is replete with all the latest improvements for loading and discharging expeditiously. A complete electric light installation is fitted, including an Edge at the hatches. A powerful quick warping steam windlass is fitted forward for working the cables and steam steering gear is fitted aft, tiller with hand screw gear aft, and a large multitubular donkey boiler is also fitted. Accommodation for the captain, officers and engineers is arranged in deckhouses amidships, the crew and firemen being berthed in the forecastle. The cabins are heated with heater, and the sanitary, ventilating and lighting arrangements are effected on the most improved lines. Triple expansion engine was designed and fitted by Messrs. Richardsons, Westgarth & Co., Ltd., Hartlepool, having cylinders [illegible] in., [illegible] in. and [illegible] in. stroke, with two large single-ended boilers working at a pressure of 180 lbs. per square inch. The trial trip took place on December [illegible] and engines and all auxiliaries working very satisfactorily. A Cochran Auxiliary donkey boiler with patent seamless furnace has been supplied and fitted.

Baldur. On December 8th, there was launched from the yard of Messrs. Cochrane & Sons, Selby, a steel screw trawler, the principal dimensions being [illegible] ft. by 23 ft. 6 in. by [illegible] ft. 3 in. moulded. The vessel has been built to the order of Peter J. Thorleifsson of Hull, Reykjavik, Iceland, and will be replete with all the latest improvements for the fishing trade. She will be fitted with powerful triple expansion engines by Messrs. Ames & Smith, Ltd., of Hull.

Deptford. On December 14th, the Blyth Shipbuilding and Dry Docks Company, Ltd., launched from their shipbuilding and graving docks work, the fine steel screw steamer *Deptford*, built to the order of Messrs. Wm. Cory & Son, Ltd., London. This vessel, which is a sister ship to the one which the Blyth Company recently built for Messrs. Cory, measures 230 ft. 3 in. in length, breadth 33 ft. 3 in., and has been constructed under Lloyd's Special Survey for their highest class. She is of the raised quarter deck type, having bridge and topgallant forecastle. The accommodation for the captain, officers and engineers is in the bridge, whilst crew will be housed in topgallant forecastle. The *Deptford* is specially adapted for the coal trade, having specially large self trimming hatches and clear holds, and is equipped with the best and latest design of deck machinery for the quick and economical working of the cargo. Triple expansion engines of ample power will be supplied by Messrs. Geo. Clark, Ltd., Sunderland. Messrs. Wailes Dove & Co.'s "Bitumastic" enamels have been applied to the bunkers and tank top, etc.

Campeiro.—On December 18th, Messrs. Wood, Skinner and Co., Ltd., launched from their shipbuilding yard at Bill Quay-on-Tyne, a finely modelled steel twin screw steamer which they have built to the order of Messrs. Pipe & Co. of London for Messrs. The Empreza De Navegacao Sul Rio grandense of Rio Grande do Sul. The vessel is of the awning deck type and designed to carry a deadweight cargo of about 4,000 tons on a moderate draught. An ample supply of water ballast is carried in the double bottom and peak tanks. She will be rigged as a two-masted schooner and will be fitted with double derricks, derrick booms and outriggers and will have eight steam windlasses, direct acting steam windlass, steam and hand steering gear and complete electric light installation throughout, also large refrigerated meat, fruit and store chambers. The saloon and state-rooms are provided in a steel house on the awning deck amidships, with captain's room and chartroom in house on bridge deck above. The officers' and engineers' accommodation is in deckhouses on the awning deck and the seamen, firemen and petty officers are berthed forward. The vessel will be commanded by Captain M. G. Nicolle, of Liverpool. She will be fitted with twin-screw machinery by Messrs. Richardsons, Westgarth & Co., Ltd., of Middlesbrough, supplied with steam by two steel multitubular boilers working at a pressure of 180 lbs. per square inch. Both the ship and engines have been contracted to Lloyd's rules for their highest class, fleetion under special survey.

LAUNCHES—Scotch.

Mont Agel.—On December 6th, a steel steamer of about 5,033 tons gross, named *Mont Agel*, was launched at Dunkirk. Owners, Sociedade Anonyme Maritime a Vapeur "The Port of Bordeaux" to Marseilles.

Milford Hall.—On December 23rd, the *Milford Hall* was launched from the yard of Messrs. Barclay, Curle and Company, Whiteinch. The *Milford Hall* is a large liner of the [illegible] belonging to the Lancashire Hall Line, and is of about [illegible] tons deadweight carrying capacity. Her boilers are constructed to a special design, which will

enable large objects, such as engines and machinery, to be quickly stowed. Her dimensions are: Length, 410 ft. 6 in., beam, 53 ft. 6 in., and draft, 32 ft. 5 in. She is to be fitted with triple expansion engines by the builders, and will have a speed of about 12 knots. The vessel is built to the highest class of the British Corporation.

Venturia. On December 26th, Messrs. Russell & Co., Port Glasgow, launched a passenger and cargo steamer which they have built to the order of Messrs. Gow, Harrison & Co., Glasgow. The vessel is 423 ft. 4 in. in length, 56 ft. in breadth, 30 ft. 6 in. in depth (moulded), and of 5,000 tons gross. The latest improvements for the handling of cargo have been provided. During construction the vessel was superintended by Mr. Charles Edington, the superintendent of the company, assisted by Captain Crocker and Captain M'Dougall, the latter of whom will be in command of the steamer when completed. Messrs. J. G. Kincaid & Co., Greenock, will supply the engines. The *Venturia* is a sister ship to the *Palamosa*, which was launched recently by Messrs. Russell & Co. for the same owners.

Arracan. On December 26th, Messrs. William Denny and Brothers, Dumbarton, launched for Messrs. P. Henderson & Co., Glasgow, the steamer *Arracan*, a sister ship to the *Mandalay*, which was launched from the same yard about a month ago. Like the *Mandalay*, the *Arracan* is intended purely for cargo purposes, and is fitted with a very complete set of appliances for loading and discharging. The vessel is 425 ft. in length between perpendiculars, 54 ft. in breadth, and 30 ft. 9 in. in depth moulded. The machinery, consisting of triple expansion engines supplied with steam from three boilers, has been constructed by Messrs. Denny & Co., Dumbarton. The classification is with the British Corporation Registry.

Ramos.—On December 27th, there was launched from the yard of Messrs. Napier & Miller, Ltd., Old Kilpatrick, the steel twin screw cable steamer *Ramos*, built to the order of Messrs. The Amazon Telegraph Co., Ltd., London, for service on the river Amazon. The vessel's dimensions are: Length, 121 ft.; breadth, 25 ft.; depth, 8 ft. 3 in.; with a gross tonnage of about 250 tons, built to the rules of the British Corporation. The vessel is rigged as a two-masted schooner, has main, promenade and sun decks, accommodation for captain, officers and electricians is provided for on the promenade deck, the crew being berthed on the main deck, electric light is fitted throughout, and the vessel has a steam windlass, steam steering gear, and water ballast in fore and aft peak tanks. Machinery is being supplied by Messrs. Miller and Macfie, Ltd., Glasgow, and consists of two sets of triple expansion engines and one large boiler.

Raindrop & Daniel Stroud.—On January 4th, two steam trawlers were launched at Aberdeen. One, named the *Raindrop*, was built to the order of Mr. Thomas Davidson and Captain Wood, Aberdeen. The vessel, which will be supplied with triple expansion engines, is 105 ft. in length between perpendiculars, 21 ft. in breadth, and 12 ft. 6 in. in depth. The other trawler, named the *Daniel Stroud*, was built to the order of the Stroud Steam Fishing Company, Aberdeen. The vessel, which is 115 ft. in length, 22 ft. 6 in. in breadth, and 13 ft. in depth, will be supplied with triple expansion engines of 400 h.p.

Yurimaguas.—On January 15th, there was launched from the yard of Messrs. Murdock & Murray, Limited, Port Glasgow, a steel screw steamer named *Yurimaguas*, the dimensions being 148 ft. by 30 ft. by 15 ft. 6 in. moulded. The vessel has been built for passenger and cargo service on the River Amazon, and will be fitted with powerful triple expansion engines by Messrs. Ross and Duncan, Glasgow.

Indraghiri.—There was recently launched at Govan the steamer *Indraghiri*, which has been built for the Indra Line, of Liverpool. The vessel is 430 ft. in length, 53 ft. 8 in. in breadth, 33 ft. 1 in. in depth, moulded to upper deck, and of about 5,750 tons gross. She has been built to the highest class at Lloyd's, is fitted with a double bottom for water ballast, and has all the most modern appliances for handling cargo. Accommodation is provided for a few passengers in staterooms amidships on the bridge deck. The vessel is to be fitted with a refrigerating installation.

Tioga. There was launched recently at Grangemouth the oil tank steamer *Tioga*, which has been built for the Anglo-American Oil Company, London. The vessel, which is of the raised quarter deck type, will carry about 750 tons on a light draught, her dimensions being: Length between perpendiculars, 180 ft.; breadth, 31 ft.; and depth moulded, 13 ft. 6 in. Her engines are placed aft, and the holds are subdivided into eight oil tight compartments with expansion trunk and hatches.

Wiltshire.—Recently, Messrs. John Brown & Co., Clydebank, launched a twin-screw steamer named the *Wiltshire*, which they have built to the order of the Federal Steam Navigation, Ltd., London. The vessel, which has been built to Lloyd's 100 A1 class, is similar to the *Argyllshire* and *Shropshire*, which were also built at Clydebank last year. The principal dimensions of the vessel are: Length between perpendiculars, 525 ft.; breadth (moulded) 61 ft.; depth to shelter deck, 45 ft.; and gross tonnage about 11,000 tons. The *Wiltshire* has been built for the trade between Australia and Great Britain. The holds are insulated for the carriage of frozen mutton, fruit, provisions, etc., and are provided with complete refrigerating apparatus. In addition to the large cargo capacity there is accommodation for about 120 first-class passengers. The propelling machinery will consist of two sets of quadruple-expansion engines, to which steam will be supplied by four large boilers.

Baron of Jedburgh.—Recently, Messrs. A. Rodger and Company, Port Glasgow, launched the steamer *Baron of Jedburgh*, which they have built to the order of Messrs. Hugh Hogarth & Sons, Glasgow and Ardrossan. The vessel is of 4,430 tons gross, and has a deadweight carrying capacity of 8,600 tons. She is 410 ft. in length, 27 ft. 6 in. in breadth, and 54 ft. in depth. Triple expansion engines will be supplied by Messrs. David Rowan and Company, Glasgow. The steamer was superintended during construction by Messrs. Hutchison & Robertson on behalf of the owners. The *Baron of Jedburgh* is one of the largest vessels ever built by Messrs. A. Rodger & Co.

LAUNCH Irish.

Vauban.—On January 20th, Messrs. Workman, Clark and Co., Ltd., Belfast, launched from their North Yard the second of three vessels for the British and South American service of the Liverpool, Brazil and River Plate Steam Navigation Company, Limited (Messrs. Lamport and Holt, Ltd., Liverpool, managers). The new vessel is named *Vauban*, and like the sister vessels the *Vandyck*, which is now in active service, and the *Vestris*, which will be launched shortly, has been specially designed for the requirements of the above service. The *Vauban* is 511 ft. in length, with gross tonnage of about 10,000, and has been constructed in accordance with the requirements of the highest class in the British Corporation Registry of Shipping, and also fulfils the conditions laid down by the British Board of Trade for a first-class passenger certificate. In designing the vessel special attention has been given to the arrangement of the passenger accommodation with a view to securing the utmost comfort for the large number of first and second-class passengers provided for, while the emigrants are well catered for in the spaces set apart for their use. The first-class passengers' accommodation is situated in the midship portion of the vessel, and occupies four decks. The staterooms throughout are large and well appointed, a number of them being arranged on the tandem system, while several sets of rooms have communicating doors, so that they may be engaged as family suites if desired. A number of special cabins are also provided, each with a separate lavatory. The accommodation for second-class passengers is on the same liberal basis as for the first-class. Other interesting features are: The gymnasium, fitted up with appliances for various forms of physical culture and exercise; the well-appointed barber's shop; the suitably furnished doctor's consulting room and dispensary; the laundry fitted with electrically driven machinery, and the galleys and pantries for each class, with their several installations of culinary appliances. The vessel is thoroughly abreast of the times as regards the important questions of ventilation, heating, water and sanitary services, and electric

supply for power and lighting, all of which have received careful consideration combined with efficient workmanship. The freight section of the vessel is also exceptionally equipped, the large space being divided into five spacious holds practically free of obstruction. A considerable number of the large compartments are fitted up for the carriage of chilled meat, fruit and produce, and are insulated on the most improved sytem, while an efficient installation of coolers and fans will preserve these consignments and ensure their delivery in fresh and perfect condition at the end of the voyage. The vessel is propelled by twin screws driven by two sets of quadruple expansion engines, carefully designed and balanced so as to reduce vibration to a minimum.

TRIAL TRIPS.

Horngarth. On December 28th, the first-class cargo steamer *Horngarth*, built by Messrs. Robert Thompson and Sons, Ltd., at their Southwick Yard, to the order of Messrs. The Horngarth Steamship Co., Ltd. (Messrs. Turnbull Brothers, managers), of Cardiff, proceeded to sea for her official trial. The trial trip was very successful, the engines running with the utmost smoothness, a mean speed of over 11 knots being easily attained, and Mr. Philip L. Turnbull (managing director) on behalf of the owners expressed entire satisfaction with the vessel and her machinery. Amongst those present were Mr. Philip L. Turnbull, Mr. Harold Turnbull, Mr. T. C. Alder, Mr. F. Shepherd (Messrs. Blair & Co.), and Mr. A. J. Hildrey representing the builders. After the trial the vessel proceeded to Newport under the command of Captain Stainthorp. See Launches, January.

Santaren.—On January 6th, the new steel screw steamer *Santaren*, built by Messrs. John Readhead & Sons, Ltd., West Docks, South Shields, to the order of Messrs. Scrutton, Sons & Co., London, for their "Direct" Line was taken to sea on her official trial trip. The trial trip was in every way satisfactory to all concerned. The Santaren afterwards proceeded to Antwerp to load under the command of Capt. Norris. See Launches, January.

Gourko.—The s.s. *Gourko,* which Earle's Shipbuilding and Engineering Co., Ltd., have constructed for Messrs. Thos. Wilson, Sons & Co., Ltd., for their Baltic and Mediterranean trades, had a very satisfactory trial trip recently. The dimensions of the *Gourko* are: Length, 318 ft.; breadth moulded, 42 ft.; depth moulded, 19 ft. 11 in. She has been constructed of steel throughout to British Corporation highest class and to Board of Trade latest requirements. The vessel is of the shelter deck type, and the accommodation consists of state rooms for about 27 first-class passengers, spacious dining saloon, lavatories, bath rooms, etc., the saloon and cabins being fitted with electric light and bell installation and well furnished to ensure the comfort of passengers. The saloon, officers' and engineers' living rooms are all heated by steam, and the work throughout the vessel is of the very best description, with the latest improvements. The officers and engineers are berthed in sidehouses abreast of the engine casing. She has two steel pole masts, and very efficient appliances for the speedy handling of cargo, the derricks being capable of dealing with heavy lifts. The derricks are worked by powerful steam winches of the most up-to-date description, and a steam windlass by Messrs. Emerson, Walker and Thompson has also been fitted. The steering engine is placed in the deck house aft, and is worked by the telemotor system from the navigating bridge; powerful hand screw gear is also provided, both of which have been supplied by Messrs. Ames and Smith, Hull. The vessel is fitted with triple expansion engines, steam being supplied by two large steel boilers, which are designed to drive the vessel at a good speed on a minimum of coal consumption.

Hurunui.—Recently, the New Zealand Shipping Company's new Clyde built twin screw steamer *Hurunui* ran her trials on the Firth of Clyde, and attained a speed of nearly 16 knots on a six hours' run. After the trial the vessel left for London to take up her station in the company's service between this country and New Zealand. See Launches, January.

BOARD OF TRADE EXAMINATIONS.

1911 — Extra First Class

Nov.	2nd	Allen, D.	Ex 1C Glasgow
,,	2nd	Atherton, J. H.	Ex 1C Liverpool
,,	2nd	Forrest, H.	Ex 1C London
,,	2nd	Laing, G.	Ex 1C N. Shields
,,	2nd	McConnell, W.	Ex 1C Liverpool
,,	2nd	Walls, T.	Ex 1C Belfast

NOTE: 1C denotes First Class. 2C Second Class.

October 19th, 1911

Anderson, R.	1C	Glasgow
Balfour, A.	1C	Leith
Briddon, W.	2C	Cardiff
Breingan, W.	1C	Glasgow
Brown, C.	2C	W. Hart'l
Campbell, D.	1C	Glasgow
Carroll, P.	1C	Liverpool
Chaffey, F.	2C	South'ton
Clark, J.	2C	N. Shields
Cook, C.	2C	Barrow
Dougan, A.	1C	Glasgow
Durbin, T.	1C	W. Hart'l
Durrant, E.	1C	N. Shields
Elliott, G.	2C	London
Franks, R.	2C	South'ton
Graham, W.	1C	London
Grant, J.	2C	Liverpool
Goodall, L.	1C	Liverpool
Harley, J.	2C	Leith
Harris, A.	2C	London
Hill, T.	1C	W. Hart'l
Irvine, A.	1C	Leith
Jones, A.	1C	Cardiff
Mainwood, W.	2C	Liverpool
Mawdsley, H.	2C	Liverpool
Moss, J.	2C	Glasgow
Murray, C.	1C	Glasgow
Petrie, J.	1C	N. Shields
Rawlings, H.	2C	Cardiff
Richardson, T.	2C	W. Hart'l
Roberts, J.	2C	Cardiff
Runham, W.	1C	South'ton
Scott, J.	2C	Glasgow
Sergeant, W.	1C	W. Hart'l
Smith, D.	2C	London
Spence, W.	1C	Leith
Stevenson, W.	2C	London
Sturdy, W.	2C	Cardiff
Sutherst, H.	2C	W. Hart'l
Taylor, R.	2C	Plymouth
Thomas, E.	1C	Liverpool
Waites, J.	1C	W. Hart'l
Wale, P.	1C	N. Shields
Will, J.	1C	Glasgow
Wilson, J.	2C	W. Hart'l
Wilson, T.	1C	Glasgow

October 26th

Allen, J.	1C	N. Shields
Ashton, W.	2C	N. Shields
Beed, G. T.	2C	Liverpool
Blair, J.	1C	N. Shields
Broom, J.	1C	Greenock
Brown, A. M.	2C	London
Brown, A. F.	2C	Greenock
Charlton, A.	1C	Aberdeen
Colbeck, O. A.	2C	N. Shields
Copeland, J.	2C	Liverpool
Daly, J.	2C	Liverpool
De Redder, H.	2C	N. Shields
Dormanin, L.	1C	London
Dunn, C.	2C	Bristol
Ficken, W.	1C	London
Finch, F.	1C	N. Shields
Gascoigne, H.	2C	London
Gow, W.	2C	Greenock
Haney, J.	2C	Liverpool
Heatley, G.	1C	N. Shields
Jones, W.	2C	Liverpool
Kennedy, J.	1C	Aberdeen
Knight, F.	2C	London
Lawrence, C.	1C	Aberdeen
Lydon, J.	1C	Aberdeen
McArthur, C.	2C	Liverpool
McConnell, R.	2C	Greenock
McFarlane, W.	2C	Greenock
McGregor, D.	2C	London
Millar, A.	2C	Aberdeen
Milligan, J.	1C	Greenock
Mitchell, A.	2C	Sunderl'd
Nicholson, E. F.	2C	Hull
Pettigrew, S.	1C	N. Shields
Pickles, E.	2C	N. Shields
Pitzcharles, E.	2C	Greenock
Richardson, E.	2C	Sunderl'd
Rogers, H.	1C	Liverpool
Ross, S.	1C	Bristol
Sharman, F.	2C	N. Shields
Sims, R.	1C	London
Smith, G.	2C	Hull
Stephenson, A.	1C	Sunderl'd
Watt, J.	2C	Hull
Whelan, J.	2C	Hull
Wilkinson, C.	2C	London
Wilkinson, J.	1C	Bristol
Williams, A.	2C	Liverpool
Wood, W.	2C	Liverpool
Young, J.	2C	N. Shields

November 2nd.

Aitken, H.	1C	Leith
Brown, J.	1C	Liverpool
Brown, J.	1C	N. Shields
Callen, R.	2C	Leith
Cunningham, B.	2C	London
Daniel, T.	1C	Liverpool
Davies, J.	2C	Cardiff
Douglas, W.	2C	N. Shields
Dunlop, J.	1C	Glasgow
Ferguson, V.	2C	Cardiff
Forsyth, J.	2C	Glasgow
Gribbe, M.	1C	Liverpool
Glen, J.	1C	Glasgow
Hall, C. T.	2C	London
Hemingway, G.	1C	London
Houston, W.	1C	Cardiff
Hughes, J.	2C	Glasgow
Jacobs, W.	1C	South'ton
Johnson, H.	2C	N. Shields
King, J.	1C	Glasgow
Kinsman, S.	2C	Cardiff
Knibbs, W.	2C	Liverpool
Langdon, W.	2C	N. Shields
Lloyd, B.	1C	Cardiff
McNally, G.	2C	London
McIlhatton, J.	1C	Glasgow
Mansfield, A.	1C	London
Scott, W.	2C	Glasgow
Suddes, T.	2C	N. Shields
Thompson, G.	2C	N. Shields
Westhouse, J.	2C	N. Shields
Woolley, T.	2C	Glasgow
Zammitt, V.	2C	Cardiff

November 9th.

Allan, A.	2C	Liverpoo
Andrews, R.	2C	London
Balfour, J.	1C	London
Boggiano, J.	2C	Liverpool

November 9th

Brown, J.	1C	Glasgow
Buckwell, E.	1C	Liverpool
Burlinson, W.	2C	N Shields
Burnett, G.	1C	Glasgow
Cameron, H.	1C	Glasgow
Core, J.	1C	Dover
Cowle, P.	1C	Liverpool
Davies, E.	1C	Liverpool
Dickinson, J.	1C	Liverpool
Duncan, J.	2C	Glasgow
Evans, J.	1C	Liverpool
Freeman, W.	1C	Glasgow
Garrick, R.	2C	N Shields
Gill, E.	2C	London
Glover, G.	2C	Liverpool
Gordon, A.	2C	Glasgow
Harrington, J.	2C	Glasgow
Hart, W.	2C	Glasgow
James, T.	2C	N.Shields
Lewis, F.	1C	London
Macfarlane, R.	2C	Glasgow
Mackay, R.	1C	London
Marshall, F.	2C	N Shields
Mason, F.	2C	London
Neall, A.	2C	London
Ritchie, J.	1C	Glasgow
Shiells, W.	2C	N Shields
Simpson, R.	1C	Glasgow
Smith, A.	2C	Glasgow
Smith, D.	1C	N Shields
Smith, G.	2C	London
Tindle, J.	2C	N Shields
Whyte, A.	1C	Liverpool
Winter, J.	1C	N.Shields
Wright, H.	2C	Liverpool
Yuill, J.	1C	Glasgow
Marten, F.	1C	Liverpool
Maxwell, J.	2C	Glasgow
Murphy, J.	2C	Belfast
Prettyman, E.	2C	Falmouth
Reed, C.	2C	N.Shields
Ress, R.	1C	Liverpool

November 16th.

Algar, W.	1C	Hull
Barclay, R.	1C	Greenock
Binnie, A.	2C	Greenock
Black, J.	2C	Greenock
Cameron, W.	1C	London
Craig, J.	2C	Greenock
Doxford, H.	2C	N.Shields
Duncan, J.	1C	Liverpool
Fletcher, M.	2C	N Shields
Galloway, W.	2C	London
Goodwin, H.	1C	London
Griffith, W.	1C	Liverpool
Houston, E.	2C	Greenock
Kay, C.	1C	Hull
Kelso, J.	1C	London
Lennox, J.	1C	Liverpool
Macfarlane, P.	1C	Greenock
Mackay, D.	1C	Liverpool
Maclachlan, L.	2C	Greenock
Milne, J.	1C	Dundee
Munroe, W.	1C	Greenock
Nilssen, A.	1C	N.Shields
Pawson, T.	2C	London
Penman, G.	2C	N.Shields
Platt, J.	1C	Liverpool
Richardson, H.	2C	Hull
Sanderson, R.	2C	N.Shields
Scott, J.	1C	Hull
Tulloch, T.	2C	Greenock
Warren, A.	1C	Liverpool
West, F.	1C	London
Wilkes, S.	1C	N.Shields
Wood, J.	2C	London

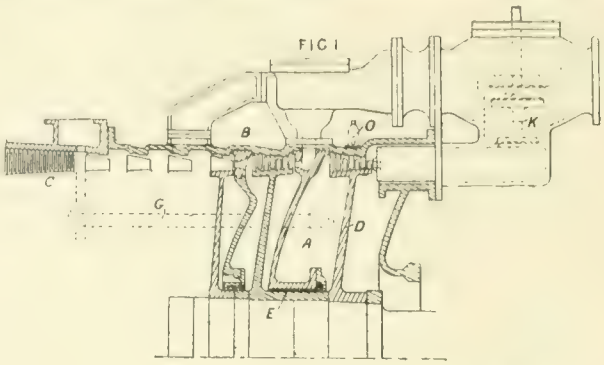
November 23rd.

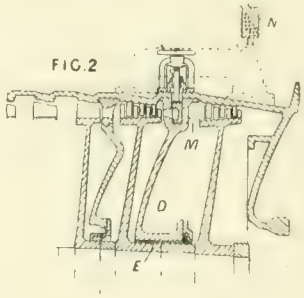
Barham, R.	1C	N.Shields
Beedle, E.	2C	Leith
Belsland, W.	1C	N.Shields
Black, A.	1C	Glasgow
Bremner, H.	2C	South'ton
Cameron, J.	1C	Glasgow
Carrigan, T.	1C	London
Cassidy, J.	2C	W. Hart'l
Coates, S.	1C	Cardiff
Cole, R.	1C	N.Shields
Convery, B.	1C	Glasgow
Craine, H.	2C	W. Hart'l
Cubitt, T.	1C	Glasgow
Doe, J.	1C	London

The Marine Engineer and Naval Architect Patent Record.

Compiled by Messrs. E. P. Alexander & Son, Chartered Patent Agents, 306, High Holborn, London, W.C.

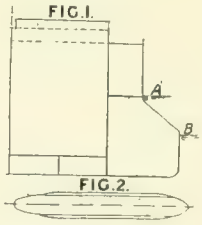
21,195. Turbines.—A main turbine and a cruising-turbine are mounted on the same shaft, and the cruising-turbine has a valve-controlled connexion with a low-pressure stage of the main turbine, and further, when in operation, exhausts through valve-controlled nozzles into the main turbine. In the event of failure to open the valves, a by-pass connexion controlled by an automatic valve is provided between the turbines to operate on increase of pressure and to give an alarm. The main turbine has a number of impulse stages B and a reaction stage C, and the low-power turbine A, housed in a separate part of the casing separated by a diaphragm D, has a single impulse wheel. The diaphragm D is provided with labyrinth packing E and with carbon ring packing held in place by a garter spring. A valve-controlled pipe G connects this turbine with one of the low-pressure stages of the main turbine when only the main turbine is in operation, but, when the steam is admitted by the double-beat valve K to the cruising-turbine, the steam exhausts from the turbine A into the main turbine by means of valves M, Fig. 2, controlling nozzles in the diaphragm D. An escape valve N is provided, to operate at any desired pressure, to by-pass steam to the main turbine in case of failure to open the





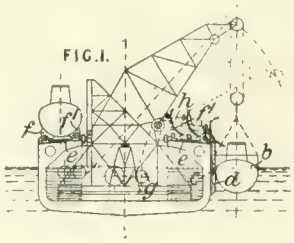
valves M, and a blow-off valve or steam whistle O gives an alarm. The steam may be exhausted from the turbine A into one of the lower stages of the main turbine.

21,841. Ships.—An improved type of ship is characterized by an upper narrow hull connected under water by an inclined surface to a broad hull, which runs off into the narrow hull at the ends. The still-water load-line



B is on the broad part, and the sea loading-line A on the narrow part. Such a ship is adapted for use with or without water ballast for sea-going purposes.

22,039. Ships.—In a ship having a crane for lifting submarine boats on board, as described in the parent Specification, the boats *b* are guided by means of rollers *c* on the boats, engaging guides *d* on the sides of the ship. The boat, when raised to the deck level, is caused



to rest upon supports *f*1, which are then traversed inwards by means of screwed spindles *e* etc., the boat being held steady by means of ropes *h* winding on drums *g*. An outer support *f* is finally placed under the boat.

The Marine Engineer

And Naval Architect.

LONDON, MARCH, 1912.

THE SUBMARINE DISASTER

IT is our sad duty to again chronicle another submarine disaster. This is the fourth catastrophe that has happened with these vessels in the British Navy. It will be remembered that in two previous cases, *viz.*, *A I* and *C II.*, the cause was collision and the third, *viz.*, *A8*, was sunk off Plymouth owing to water being shipped through the open main hatch. In the present instance H.M.S. *Hazard*, was in concert with other ships, carrying through certain naval operations in dark and dirty weather and came into collision with the submarine *A3*; the latter sank and the whole of the crew were drowned. There has been much discussion after each disaster as to the provision of some form of safety appliance to enable the crew to escape when the vessel sinks to the bottom. Now it must be clearly recognised, that whatever appliances had been provided in the cases of collision referred to above the result would have been the same, the drowning of the crew, for the reason that the damage in such a case is so extensive and so sudden that the crew have no chance whatever to save themselves and must inevitably perish. It may be said that by the sub-division of the hull and compartments, or by providing a double shell the risk of disaster may be reduced, but this can only be carried out by increasing the weight of the hull, and reducing the weight of other parts, with the possible reduction in efficiency of the propelling and manipulating machinery. It has been argued that our salvage equipment should be increased, especially at the naval bases, but it must be remembered that these vessels often operate in deep water and at a considerable distance from the base. However, we think that suitable provision should be made in this direction, but at the same time, something further should be done by providing the large ships to which the submarines are attached with appliances which can be used at the time, to render assistance for the liberation and saving of the crew of a foundered submarine. One hears criticism as to the wisdom of, or necessity for, the practising of submarines under conditions involving bad weather, darkness or other adverse features, but it must be remembered that the boats may have to operate under such conditions, and it is most essential that practice should take place as far as possible under those conditions which may obtain in the time of war, for the fine weather conditions in broad daylight are hardly those under which to train men who are expected to do full justice to the demands made upon them under stress of war or storm.

LAUNCHING RISKS.

IT is generally assumed that the risks connected with the launching of a ship into common waters are mainly associated with physical matters dependent upon mechanical action in some way or other, and the layman is apt therefore to overlook risks of another character, *viz.*:—those relating to the rights of others in the user of the common waters. This feature has been brought out prominently with reference to the litigation that has taken place as to the damage caused to the ketch *Francis* when the hull of the steamship *Highland Loch* was launched from the Tranmere yard of Messrs. Cammell, Laird & Company, on the Mersey.

The facts of the case were very simple, and may be put shortly as follows: On the day that the *Highland Loch* was to be launched, the *Francis* was anchored in the Mersey opposite the shipyard, and was duly warned by the shipbuilders to move from the position taken up. The anchor, however, had got foul of some moorings in the river, and her captain refused to slip his anchor and have his vessel towed away to a safe position by the tug sent to carry out the purpose. The result was that the launch took place and the *Francis* was struck and damaged. When the case was tried by the Admiralty Division judgment was given in favour of the *Francis* on somewhat anomalous grounds. It was held that the captain of the *Francis* was at fault in not slipping his anchor when warned, but the Court considered that the launch was not justified while the *Francis* was in the danger zone, and the judgment given was based on the principles of common law, under which the owners of the *Highland Loch* were held to be solely liable on the ground that although there was negligence on the part of those on the *Francis*, the damage could have been avoided by the postponement of the launch. Having regard to the unsatisfactory character of the decision from the shipbuilders' standpoint, the case was taken to the Court of Appeal, which reversed the decision of the Admiralty Court on the ground that the judge had overlooked the fact that there was danger involved in the postponement of the launch, and that Messrs. Cammell, Laird & Company's manager, in ordering the launch to proceed, had only, in making a choice between two evils, chosen what in his opinion was the lesser one, and under these circumstances the *Francis* was entirely to blame. It would appear to any level-headed man that this decision was in strict accordance with common sense and did not affect the existing legal decisions on the point and certainly does not lay down any new dictum that a ship may be launched on to common waters utterly regardless of the consequences to property owned by other users of the waters. The decision of the Court of Appeal was taken to the House of Lords and their Lordships have recently given their judgment.

The House of Lords appear to have had no difficulty whatever in arriving at their decision, for they did not call upon the respondent's counsel, and dealt with the case as one of fact and not one of law, and thus cleared away a good deal of matter which had been discussed in the Courts below on the legal basis only. Their Lordships expressed their entire satisfaction with the grounds on which the judgment of the Court of Appeal was based. The Lord Chancellor stated that the ketch was, in his opinion, wholly to blame, and that it was not easy to discover any neglect of duty on the part of those carrying out the launch. For example, it was argued that it ought to have been ascertained that the mooring chains were not a source of obstruction on the bed of the river, but the answer was that the shipbuilders did not own the buoy, and the matter was too remote for consideration. Again, it was suggested that warning should have been given as to the existence of a trap in the river bed, but this was also too remote, as no person could forecast that the vessel would foul the chains. It was then said that a vessel should have been placed in the river at the lower side of the yard to warn vessels coming up, but the answer that the *Francis* was specially warned two hours before the launch was considered quite satisfactory. A further complaint was set up that it was wrong to continue to remove shoring blocks after it was known that the *Francis* was in the way, which was combated by the contention that the shipbuilders could not be supposed to know that the *Francis* would act in such an unreasonable manner as it did. Their Lordships were of opinion that it was an unreasonable contention that the shipbuilders should have paid the value of the anchor. Now it may be said that the point taken by the *Francis* is that the launch should not have taken place, but that as it did the damage caused was not inevitable. The view of the Court of Appeal on this point was confirmed by the House of Lords, as it was held that it would have been dangerous to the workmen in the yard and to the craft in the river to have postponed the launch, and that as the shipbuilders had to take one of two risks and they took the lesser one, there was no blame attached to them at all. The result was that the appeal to the House of Lords was dismissed. This case sets out features in which a certain amount of give and take and reasonable consideration should be given by the parties whose interests are involved, and the various judges who have dealt with the case are all agreed that the *Francis* was at fault, and the action of her captain has been described as a typical illustration of unreasonableness. We feel sure that the final judgment will be accepted as the right and proper one by all fair-minded people, as ships must be built and launched, and for a short time an exclusive use of a waterway may be imperatively demanded, but such rights of user must be exercised with proper reasonableness in relation to the rights of others.

NATIONAL INSURANCE AND THE MERCANTILE MARINE.

THE National Insurance Act, in its application to the mercantile marine, will require careful consideration on the part of the Commissioners appointed to deal with the details. Many engineers are already insured to receive benefit at age limit, or under other conditions. The Shipping Federation Benefit Insurance was altered to suit the Workmen's Compensation Act, so that whereas an allowance was formerly paid on account of disablement or illness under special conditions, now there remains only the amount of £10, due at death, to the nominee of the assured, whose payment is 1/ per annum; this applies to all ranks and ratings. Many firemen are connected with benefit societies, perhaps chiefly for the benefit of the widows or relatives. Voluntary subscriptions and donations from vessels and members of the crews, by means of collecting boxes and other means, are given to orphanages, as The Royal Merchants' Seamen's, The Scottish* and The Royal Caledonian; and Institutions such as the Royal Alfred and Scottish Corporation. These agencies contribute in helping the seafarer and those dependent upon him, and are all doing good work, each in its own way, and we commend them for consideration, specially at the present time, in view of the new Insurance Act, that they may not be overlooked in the negotiations. The proposed composition of the Committee to form a Society to deal with the seafarers who are not members of a Benefit Society within the Act, is to be composed of equal nominations from the Board of Trade, the shipowners and the seafarers, so that at least the Committee must consist of three and a chairman, but in view of the various classes represented in the mercantile marine, where we have officers in the deck and engine departments and workers in each, in addition to the catering department, or five in all, each with the views peculiarly its own, the question of representatives involves consideration of adequate representation. Allowing one representative for each section the Committee would number, with the Chairman, sixteen in all; a Committee of this size appears cumbersome, and it seems desirable to reduce rather than increase it, and, if it were possible to select three members who would commend themselves, each to the department he was most qualified to represent, that is to say, deck, engine or saloon, the Committee might be reduced to ten inclusive; and if these were chosen, not with a view to class distinctions, but for their business and common-sense qualifications, the Committee would be of ample strength to formulate a scheme and organize a Society for the benefit of all who come within the scope of the Act as far as it applies to the mercantile marine. A matter which is in great need of redress in connection with the seafaring community is the voting. Surely some means could be found to deal with this question, so that those who pay taxes should have a vote for a representative in the counsels of the nation, and now would be a fitting time to bring this about.

THE JUNIOR INSTITUTION OF ENGINEERS.—A handy size booklet has just been issued by this progressive Institution, dealing with "Its Origin and Aims," and makes interesting reading. In the paragraph dealing with the inception of the Institution, it is interesting to note that the Society came into being at the works of the late well-known firm of Messrs. Maudsley, Sons & Field, London, in 1884. Amongst the officers, presidents and vice-presidents, the names of many famous men can be noticed in the list that is given. It is pleasing to note that the rooms are kept open on Friday evenings during the months of October to May inclusive, in order that the weekly periodicals can be perused, and social intercourse promoted. In connection with each Friday evening, the opportunity is taken for the discussion of various subjects, in a very informal sort of way. Some up-to-date information, such as cannot be obtained through ordinary channels, is thus obtained. A copy of the booklet may be obtained free, on application to the Secretary, 39, Victoria Street, Westminster, London, S.W.

* Designated "The Sailors' Orphan Home."

THE FLEETS OF THE MAIL LINES.

The Hawke-Olympic Collision.

THE most exciting news of the month, from a shipping point of view at least, has surely been the announcement that divers have discovered the heavy ram of H.M. cruiser, *Hawke*, carried away by the impact of her collision with the White Star Liner, *Olympic*, in the disastrous collision of the 20th September, 1911. The heavy steel casting has, it is said, still wrapped round it parts of the plates of the *Olympic*, which were torn away by the twisting movement produced by the way of the liner, a twisting movement which, according to the evidence given at the trial, caused the warship to list over so heavily that some observers thought that she would roll over altogether. Possibly the marks of damage sustained by this wreckage from the two vessels may, under the examination of experts, afford some further evidence as to the rights and wrongs of this much debated case. But one thing is certain, the finding of the ram gives a clue weighty beyond that of any verbal evidence, as to the true spot of collision. The discovery, therefore, may have a great bearing on the result of the appeal, and one can well imagine that the news is causing a good deal of thought to those who are interested in the case. Where the ram was found it assuredly was dropped, for its weight is such as to forbid any suggestion of drifting, and it may be that the evidence of its position when found will have considerable effect upon the result of the trial when the appeal comes to be heard. That will not, I understand, be till after Easter, and thus a good deal of time can be devoted to the consideration of the new points which are now raised. If only the divers could discover also that little book, which so unfortunately fell into the sea when the shock of the collision was felt by the officer of the *Hawke*, that might help to elucidate matters too.

Coincidences.

I have often in this column called attention to the remarkable way in which ships of similar names manage to get into trouble at or about the same time. Here is another case of the kind. On the 11th February the steam trawler, *Maud*, of Fleetwood, which was being towed round from her home port to Hull, broke away from her tug in a gale and heavy sea, and went ashore near the Lizard, where she soon went to pieces. Almost at the same time came the news that a much larger vessel, the *Maude*, of Hartlepool, a steamer of nearly 3300 tons gross register, built as recently as the year 1906 at Hartlepool, by Messrs. Irvine's, had gone ashore in a dangerous position near Matanzas.

An Heroic Engineer.

On the same day as the loss of the *Maud*, a steamer was sunk off the Newarp light vessel by collision with the British steamship, *Wychwood*. This was the *Torbay*, a Norwegian vessel of some 1128 tons, bound for Middlesbrough with a cargo of ore from Bilbao. A very short time intervened between the contact and the sinking of the steamer, and of her crew of some seventeen hands only ten were picked up by the colliding vessel. Part of this loss of life was due to a very tragic circumstance. Like many of the steamers of her nationality the *Torbay* carried a stewardess, Mrs. Karlsson, who unfortunately became demented on being roused in the middle of the night to find herself in collision and on the point of going down. The men who were saved effected their escape by scrambling over the bows of the *Wychwood* from the sinking ship, and Chief Engineer Rolf Hansen, with the aid of two of his firemen—whose names have not as yet been reported—endeavoured to drag Mrs. Karlsson into safety by this way. But the poor woman effectually resisted all attempts to move her, and the precious opportunity of escaping by this means was lost. The engineer ran aft to get life belts for the little group, but it was too late. Before he could get back to them the ship went down and Mrs. Karlsson and her would-be rescuers went down together.

The Dover-Ostend Route.

It is reported that the two new turbine engined mail steamships now under construction at Holland by the John Cockerill Company for the Belgian State Railways will be an improvement even on their immediate predecessors, the *Pieter van Conyck* and the *Van Speyck*. Their speed of twenty-four knots at sea will reduce the passage across the North Sea to some 2½ hours, and the duration of the voyage will be minimised by the introduction of the Fryklas system of unloading trains, which is said have been successful in the case of Copenhagen, Germany, which has just commenced to return to the Mediterranean from a cruise round the Atlantic. Speaking of the

Cunard Line,

this Company now has under construction, in addition to the great three, a fourth for the mail line to New York, which will be, when completed, the largest steamship under the British Flag, the tonnage being about 13,000 tons gross register, and she is to take the place of the Carmania service. The order for these vessels has been placed with the Scott Company at Greenock, and the completion will enable the service to be maintained with weekly sailings. The dual service of the company in Canada has been the subject of a contract as to another point, having amalgamation with the Cunard Company. For at the beginning of February it was announced that the Royal Line of Bristol was to be absorbed by the great Liverpool undertaking. The report was generally considered, but it appears to have some little foundation, for an arrangement between the two organisations has really been made, though it is only a traffic agreement. The Royal Line finds that its ships have attained a degree of popularity with the emigrating classes beyond their capacity for passenger carrying purposes, and so an arrangement has been made whereby the excess will be shipped by the vessels of the Cunard Canadian branch in the weeks in which the Royal liners do not offer sailings.

On the 13th February, one day before the contract date, Messrs. H. & C. Grayson, of Liverpool, handed over the *Mauretania* with her repairs completed to the Cunard Company. For nine weeks work has gone on unceasingly, week day and Sunday alike, both by day and night, the shifts of men being constantly employed in making good the damage which the great vessel sustained early in December when, through the breaking of the mooring chain of the Cunard buoy in the Sloyne, she drifted on to the Pluckington bank. It is stated that during the course of these operations no less than seven hundred tons of new plating and other materials have been worked into her hull. She is appointed to resume her place in the mail service on the 2nd March.

The "British Standard."

It will be remembered perhaps that till the hearing of the inquiry into the loss of the *Dunsley*, the record for a prolonged investigation of this kind was held by the case of the *British Standard* where one Captain Braun was found by a Court of Inquiry at Cardiff to have caused the abandonment of his vessel by his wrongful act and default. His certificate was accordingly suspended for eighteen months, and in addition, the Court ordered him to contribute a sum of a thousand guineas towards the cost of the hearing. Blame and punishment was also meted out by the Court of Inquiry to other persons besides Captain Braun, but, as he alone appealed, we need not refer more to the others. The appeal was heard in the Admiralty Court before the two judges of that Division and the appellant appearing in person conducted his case with [illegible] though with little success. The facts as proved at the inquiry were too strong for him, and the additional evidence adduced on the appeal was significant as far as it went. For the ship's cook, who had not been available on the first occasion, came forward to testify that when the ship was a week out from Cardiff the master began selling and giving clothes to the crew. This the witness very unfavourably characterised as "unusual conduct." But this evidence was hardly necessary. What was stated at the original hearing was enough. No attempt was made by the master to discover whence came the influx of the water into the ship, or to ascertain its extent. The contrary, rather, took place, as such an examination was gravely below to see to the working of the pumps, and [illegible] deck. No bulkhead doors were shut. When the master did do so, was to have the boats lowered, provisioned and stocked. Distress signals were placed in them and fired when they were clear away from the ship. But no [illegible] from the vessel herself had to abandonment. After the boats had gone away they returned. The ship was re-boarded and her lights were taken down. But

again the signals were fired. In fact as Sir Samuel Evans said, though the steamer floated for four hours after abandonment no steps were taken to save her or to have her saved. The judges were, therefore, of opinion that the Court below was fully justified in arriving at its decision and in suspending Captain Braun's certificate as they did. As to the sum ordered to be paid as costs the Court came to the conclusion that the thousand guineas referred to was intended as a heavy fine [illegible] and the learned President pointed out that the payment of costs could not be ordered in such a way, and he held that the amount was excessive as he considered it "hardly possible that the whole costs of the inquiry" should have amounted to such a sum, and accordingly it was reduced to £350, though an additional £100 was adjudged to be payable by Captain Braun on account of the appeal. The real object of the appellant was, of course, to obtain a reversal of the judgment suspending his certificate and in that he wholly failed. As regards the question of costs it seems to the observer to have been somewhat unfortunate that no evidence as to what the actual costs of the original inquiry were, was laid before the Divisional Court. Had such evidence been adduced it might have been seen whether or not the actual amount did or did not exceed the thousand guineas to which the learned judges took exception.

The Allan Line

have, it is stated, assigned to one of their new purchases, the *Romanic*, which is now being overhauled at Belfast by Messrs. Workman, Clark & Co., the name of *Scandinavian*. This is a name which has been previously borne by a vessel of their fleet; for there was a *Scandinavian* which was built for the line in 1870 by Messrs. R. Steele & Co., of Greenock. The London and Canadian steamers of the Allan Company, by the way, are once again to use Plymouth as a port of calling, commencing with the *Sicilvin*, which leaves London for the St. Lawrence on the 19th April. It is said that Plymouth has been chosen after a full consideration of the relative merits of Southampton.

Wireless Telegraphy.

The rapidity with which wireless is spreading is indeed remarkable. It is but a short time ago that it was an experiment with Atlantic liners of the highest class, and it was then considered little more than a luxury. Now it is found in every ocean, and foreign countries are making it compulsory in vessels touching at their ports so fast that soon it will be impossible for a passenger steamer to trade oversea without an installation. The latest country to legislate in the matter is Spain, which has made it compulsory as from the 1st January, 1913. Meanwhile the United States are amending their law on the subject so as to insure that a sufficient staff of skilled operators are carried by every passenger vessel to insure that some one is always on duty, and that thus a continuous service may be relied on.

What a blessing the installation on the Donaldson liner, *Tritonia*, must have been to those on board her when they found themselves fast in the ice some ten miles from Botwood, Newfoundland, early in the month of February.

The Medina

arrived at Spithead from her memorable cruise as a Royal Yacht at 10 a.m. on Sunday, the 4th February. On Thursday, the 15th, she was paid off, and the P. & O. flag resumed its place in lieu of the White Ensign. That very afternoon she left for Greenock, where Messrs. Caird, her builders, are to remove the Royal accommodation, and bring her fittings into line with those of her sister, the *Maloja*. The work of alteration will be lengthy, as may be gauged by the fact that she is not appointed to make her first departure in the mail service till the 28th June. The completion of the "M's" now enables the P. & O. Co. to announce that their Australian service will henceforth be maintained exclusively by vessels of this class, the *China* and *India* being now relegated to the Far Eastern Line, and apparently they will still be able to release one of the "M" class on occasion to do duty as a public yacht. The arrangements are published as to intended cruising opportunities to be afforded on board the T.S.S., *Mantua*, during the next few months.

Changes in the White Star Line.

It is worthy of notice that the famous *Mauretania* is appointed to take the sailing of the 12th March to Boston. Thus like her sister, the *Teutonic*, she is cast from the Southampton mail service which, of course, during the 1912 passenger season, will be maintained on a three weekly round by the *Olympic*, *Olympic* and *Oceanic*, whereof the former is to make her maiden departure on the 10th April. The way in which the Wednesday service of the White Star Company has been kept up-to-date stands in strong distinction with the position of the American Line's Saturday sailings, which are still maintained by the four steamships which have carried it on since its establishment. One is inclined to wonder whether something in the way of improvement may not be anticipated as the Company obtains so many new and large vessels for its other services.

The Nippon Yusen Kaisha,

like other big shipping Companies, seems to believe in a policy of absorption. It is announced that negotiations are in progress for the purchase by it of the Imperial Chinese Merchant Marine Co.

THE FRUIT OF INDUSTRY.

THE unsatisfactory state of matters which exists among sections of workers is much to be deplored, and how to bring about a change for the better seems somewhat difficult, the bitterness and strife which have been growing during the past year or two being more easily kindled than allayed. The pride which the ideal tradesman takes in the labour of his hands and the skill with which he exercises his craft appear to be crushed out of him by an organized species of tyranny by men of his own class, which demands not the best from its victims, but something lower, and prevents him aspiring to the higher ideal by presenting the lower in a fashion flavoured with acrimony. The reasoning which arrives at the conclusion that the less each man does the more of his class will be employed and by so much the better it would be for all, is crude and superficial; it lacks the root work of the reasoning which searches beyond the narrow surroundings of time and self to find the direct and indirect bearings of action or inaction. If a constituent part or unit of a State lags behind, the effect tells upon the whole community sooner or later, and there are evidences that this aspect of the situation has been borne in upon some of the better thinkers among the workers and if the appeals were made wide-spread to the higher and nobler views of life, a change for the better would result, with greater harmony all round. The employer and employee ought to have a common or united interest in their particular industry, with the business maxim—the labourer is worthy of his hire, with its converse that the hire be worthy of the labourer. The tendency of present-day legislation is to crush out the small employer and produce large undertakings or corporations, a tendency which may be deplored for several reasons, chiefly of sentiment, it is true, but still good in business where loyalty to an honoured name has become a proverb.

Messrs. Crosby Lockwood & Son inform us that they have transferred their Technical Book Room from 121a, Victoria Street, S.W., to more commodious premises at No. 5, Broadway, Westminster, S.W. (opposite Vickers' House), where a representative stock of all the latest and most important engineering and technical works may be inspected.

INSTITUTE OF MARINE ENGINEERS.

Presidential Address and Presentation of Awards.

THE Most Hon. the Marquis of Graham delivered his Presidential Address at the Institute of Marine Engineers, Stratford, E., on Monday, February 12th, 1912.

In the course of his address the noble marquis said success in engineering was not due, as some imagined, to luck or chance; the whole story of engineering constituted one great history of courageous effort. A prominent statesman said not long ago that when progress, was advancing progress, it would be sure to be slow, and if the progress was very rapid, one might be sure it meant decadence. So far as engineering was concerned it was quite the other way; the more rapid the progress the more advanced was the engineering. He was of opinion that modern engineering practice would develop more particularly in two directions, greater rapidity of travel and increase in labour-saving machinery. It was a natural instinct in the human breast to try to conquer time and space, and he thought that was one reason for the constant struggle to travel faster and faster. In regard to the second line of development, the principal way in which the increased cost of living could be met was by getting a greater output from the same amount of capital and plant.

The Institute deserved credit for the study it had encouraged in the internal combustion engine. In 1897, the German Emperor, at a meeting of the Institution of Naval Architects, said he believed the fuel power of the future would be oil. That was fourteen years ago, and when one looked at the situation to-day it would be admitted that the wonderful foresight of the Kaiser was not far wrong. The steam engine using coal depended on several units of labour, the miners, the railwaymen, the dockside labourers and the stokers, each adding to the cost, with the possibility of labour troubles. Where oil was used, it could be run from the source of supply to the reservoir by a pipe-line, and run by gravity from there into the ship's tanks. It could then be blown into the furnace or automatically turned into the power cylinder; in fact, with oil it was possible to provide power without the fuel being handled by man, thus effecting great economies in labour.

He was one of the few members of the Institute who had had experience with both coal-gas engines and oil-gas engines. It was difficult to say which were the better, as both had distinctive features. With a coal gas engine in the gun-boat *Rattler* they had made a non-stop run of 220 miles from Liverpool to Glasgow, in very rough weather, and no engine ever worked more sweetly or smoothly. The fuel cost worked out at about 4d. per mile per b.h.p., using anthracite. If bituminous coal had been used the cost would have been much less. The difficulty of direct reversing in connection with the gas engine had been mastered, but until a good bituminous producer for marine use was obtained, the gas engine would not be a success.

The crude oil engine of the Diesel type was certainly a most economical and reliable engine. The only one he had had experience with was one of the Beardmore semi Diesel type fitted in his yacht. It was a two-cycle engine of 130 b.h.p., and he had run it on crude Texas oil, specific gravity ·93. The cylinders were 9-inch bore by 13-inch stroke, and at full speed it developed 350 revolutions per minute. The cost of the oil was 52s. per ton at Glasgow, and comparing that with a ship of the same power using Welsh coal at 20s. per ton, the comparative cost for a twenty four hours' run would be: for oil, £8 6s.; and for steam, £12 8s. With Scotch coal at 14s. per ton, the comparison would be £8 6s. for oil, against £8 19s. for coal, but in addition to this there would be a saving in labour, space and stand-by losses, all of which were in favour of the motor. Oil fields were being opened up in various parts of the world, and he believed that the prices would tend to decrease.

The following awards were then announced:—The Denny gold medal, awarded to Mr. W. R. Cummins (member) for his paper on "Internal Combustion Engines for Marine Use." Stephen award to the value of £2 to Mr. J. D. Boyle (graduate) for his essay on "The Steam Engine Indicator," and the Stephen award to the value of £1 10s. to Mr. H. B. Locke (graduate) for his essay on the same subject.

A very hearty vote of thanks was accorded to the Marquis, on the proposal of Mr. Alexander Boyle (vice-president), seconded by Mr. A. H. Mather (hon. treasurer), and in responding his Lordship very kindly extended an invitation to the members to inspect the engines on his yacht, the *Mairi*, now in the Thames.

A NOVEL POWER INSTALLATION FOR STEAMSHIPS.

THE Hamburg American Company have ordered from the Vulcan Company, of Stettin and Hamburg, a steamer of 22,000 tons gross register, which is to be propelled by a combination of high speed turbines with Pottinger Transformers. So far the German shipping companies have been slow to avail themselves of turbines, and the three huge Atlantic liners now building for the Hamburg American Line in Hamburg are the first merchant vessels of any importance under the German flag to be propelled by turbines.

In the case of the 22,000 ton vessel referred to above, high speed turbines of small diameter and considerably reduced weight will be used instead of the heavier and more expensive direct acting turbines, and no reversing turbines will have to be fitted. The power of the vessel is to be 13,000, and she will have one high pressure and one low pressure turbine, each running about 800 revolutions. By means of two Pottinger Transformers the revolutions will be reduced to 160 on the propeller shaft, so that large propellers of high efficiency can be used. The Transformer also does the reversing, and no reversing turbines are consequently required. The result is a very large saving in weight (over 600 tons), space and first cost.

The Hamburg American Company is to be commended on its boldness in making a first experiment on so large a vessel, and the result will be watched with the greatest interest, because the saving in weight and space of such an installation will be of the greatest importance to war vessels, and if it proves a success, there is no doubt that instead of using direct acting turbines, the different navies will be compelled in their keen competition for superiority against one another to adopt this type of installation.

So far the Pottinger Transformer has been used only on a tug belonging to the Vulcan in conjunction with a Curtis turbine, and on the gas driven vessel, *Holzapfel*. In both cases it has done its work very successfully.

We understand the Holzapfel Marine Gas Power Syndicate are interested in the Pottinger Patent rights for Great Britain.

MARINE REFRIGERATION.

HAVING, during the last few months, discussed at some length, what may for want of a better term be called the human element in the production and maintenance of a refrigerated ship, it will now not be amiss to deal with the actual appliances which may be used to secure and maintain the low temperatures required.

Refrigerating plant may be classified under two heads, namely, (1) the insulation, (2) the machinery and its appurtenances, and to deal with these two matters in their order of relative importance the writer will deal with the insulation first; because it is undoubtedly a fact that no refrigerating plant can possibly be efficient unless the insulation is maintained in a condition as near perfection as the limitations imposed by practical considerations will permit. Under the heading insulation we may conveniently group all the appliances used for the purpose of preventing heat being transmitted through the structure of the vessel into the cold chambers.

In general the insulation of a ship consists of a series of wooden bearers called "grounds," secured to the frames or beams, or other part of the ship's structure by bolts, to which is secured by means of nails the double wooden lining which holds the actual insulating medium in place. The thickness of insulating medium required varies in accordance with the position of the insulation, the nature and properties of the medium employed, and the degree of impermeability to heat desired. Thus the insulation underneath the weather deck on which the tropical sun may be beating all day is necessarily more extensive than that on a bulkhead separating one hold from another; and again, the thickness on an engine or boiler-room bulkhead will require to be greater than that on the partition bulkheads. No universal guide can possibly be given in such an article as this, each case requiring to be dealt with absolutely on its merits, and the insulation proportioned accordingly.

The insulating media most generally favoured in modern practice are, in order of popularity, charcoal, silicate cotton and cork of the granulated variety. The qualities required in an insulating medium are cheapness, lightness, absence of propensity for attacking steel or iron, and, of course, impermeability to heat.

In respect of this latter quality the three media above-mentioned run very close in practice, and although theoretically they differ in their impermeability the difference is so little that it need not be generally considered.

With regard to cheapness there is no doubt that to-day silicate easily out distances the others, and has on that account and on no other attained a temporary popularity. Its weight and detrimental action on iron and steel work render it very doubtful whether its use is more economical in the long run than the use of a more expensive medium. In the writer's opinion the choice lies between charcoal and cork, and he feels that with the high prices now ruling for charcoal, the use of cork will gradually become more extended. It possesses a quality which is found in neither of its competitors, that of drying easily when wet and becoming quite as efficient an insulator as before. Both charcoal and silicate, when wet, are utterly destroyed, and in view of the fact that wet insulation is one of the commonest troubles aboard ship, this quality appertaining to cork is important. Cork does not absorb moisture easily, and has absolutely no corrosive action on iron or steel. That cork requires care in packing is one argument commonly used against it, but all insulation requires care in packing, and the writer's experience is that where ordinary supervision is given by experienced men, it is quite easy to obtain a satisfactory result.

Charcoal enjoys a well-deserved popularity amongst refrigerating engineers, but its excessive cost and the fact that it can hardly be obtained in any quantity at any price at the present time, almost prohibits its use. Its principal quality is lightness and an almost preservative action, when dry, on iron and steel. When wet, however, it seems to have a very bad effect on these metals, no doubt due to the quantity of air contained in its interstices, which, together with the moisture, speedily destroys by oxidation the steel work it may be in contact with. A serious defect in charcoal is its habit of running to powder, which escaping through minute cracks and crannies stains the meat shirts and gives rise to complaints. It is easy to pack because it is fine and runs easily, thus careless workmanship is less likely to cause failures than with other materials.

The woodwork of insulated holds now claims our attention, and it is to be feared that less attention is sometimes given to this part of the plant than its importance warrants. No pains should be spared to secure the very best quality of wood, pitch pine or white pine being most commonly used, and it must be free as much as possible from knots or shakes, and especially from sap wood. Inattention to this latter matter leads invariably to extensive renewals, for dry rot, the bane of refrigeration superintendents, sets in, and its effects are usually so widespread as to lead to condemnation of practically the whole space infected in a very short time. Sappy wood should always be rejected without parley, and steps should be taken to ensure only well-seasoned timber being employed. The quality of the wood used for insulation has steadily deteriorated during the last few years, as a visit to an old vessel and comparison with one two or three years old will speedily convince the most sceptical of the necessity for using only the best wood, even at an enhanced cost, if future trouble is to be avoided.

The number of "grounds" should not be cut down, because the vibration consequent on the ship's rolling and pitching at sea tends to loosen the linings and to permit the escape of the insulating material, which, if charcoal be used, is a serious matter. The linings usually consist of two boards tongued and grooved with a layer of waterproof paper between. In good class work the outer lining consists of pitch pine, which takes varnish well, and looks very handsome when finished.

The upper boards in a hold and those above each stringer casing should be made portable and secured by screws. This facilitates filling when necessary and avoids the destruction of good wood when filling or opening up for examination is required. Care should be taken to pack stringers and beam knees carefully, because carelessness in these parts often gives rise to leakages which cannot be traced, and which may be the source of much inefficiency.

Air spaces between the medium and shell, or tank top and on bulkheads should be insisted on. Formerly the practice was universal, but nowadays to save a few hundred cubic feet of space owners are in the habit of fitting the insulation close up against the shell, bulkheads and tank top. In the writer's opinion this practice is the cause of more damp insulation than any other half-dozen causes combined. Still air is one of the best-known insulators itself, so that not only does the air space increase the effectiveness of the insulation, but it prevents the inroad of moisture either from sweat or leakage.

It is quite evident that shell insulation is subject to the danger of damp from slight leakages caused by bumping or injuries to the outside plating, and the tank top to leakage from stanchion feet rivets, manhole joints, etc., in addition to which sweat causes dampness in both these parts. The presence of the air space permits moisture to drain away into the bilges without injuring the insulation at all. The writer has examined scores of vessels both with and without air spaces, old and new, and has never yet seen a thoroughly dry tank top all over, except where the air space is used; and in addition, he has never yet seen a non-air space job which could compare with the air space vessels in point of condition of insulation or condition of the steel structure behind the insulation. On all counts the loss of capacity caused by using the air space is easily balanced by the advantage gained by less repairs and renewals being required.

Other points regarding insulation, ventilators, hatches, trunks, etc., will be dealt with later.

MESSRS. SUTER, HARTMANN & RAHTJEN'S COMPOSITION CO., LTD., have supplied their "Red Hand Brand" Composition to vessels representing 3,335,168 tons. The P. & O. Company's *Medina* was coated with this composition.

HEAVY OIL ENGINES.—Capt. H. Riall Sankey, R.E., M.I.C.E., will deliver a series of four lectures on heavy oil engines on April 29th, May 6th, 13th and 20th. The lectures are known as the Howard Lectures, and will be delivered before the Society of Arts on Monday evenings at 8 o'clock.

We can determine the curve joining A and F roughly from the value of P and V at A and at F, from which we get

$$P_1 \times V^{1\cdot058} = C.$$

Work done in compressing :-

$$P_1V_1 + \frac{P_1V_1 - P_2V_2}{\cdot058} - P_2V_2 = 62{,}557 \text{ ft. lbs.}$$

equivalent to 81·03 B.T.U., which is only 1·06 times the work of isothermal compression.

	Ft. lbs.	B.T.U.
Adiabatic Compression	= 81,343	105·40
With jacket and ·15 lbs. injected	= 62,557	81·03
Isothermal	= 58,846	76·20

We can now proceed to calculate what heat is available from the exhaust, and how much of it can be utilized for heating the air before it is put to do work.

In modern gas and oil engines of the total heat of combustion of the gas or oil as delivered to the engine, about 35°/₀ is turned into work, 20°/₀ is carried away by the jacket water, and about 35°/₀ by the exhaust, so we can assume that the amount of heat going away in the exhaust is equal to the amount of heat turned into work.

In our case the work done on 1 lb. air is 62,577 ft. lbs. equivalent to 81·03 B.T.U. With an overall efficiency of 85 °/₀, the work done in the power cylinder will be 95.3 B.T.U.

The temperature of the compressed air is 135°F., and that of the exhaust will be say 500°F.

Assuming that the exhaust temperature as it leaves the heater will be 235°F., we shall have

$$95{\cdot}3 \times \frac{500 - 235}{500} = 50 \text{ B.T.U. available.}$$

1 lb. air raised from 135° to say 250° takes							30·2 B.T.U.
·15 lb. water	,,	,,	,,	,,	,,	,,	17·2 B.T.U.
			Total	...	...		47·4

The balance will allow for radiation losses.

We can now proceed with the expansion diagram Fig. 2.

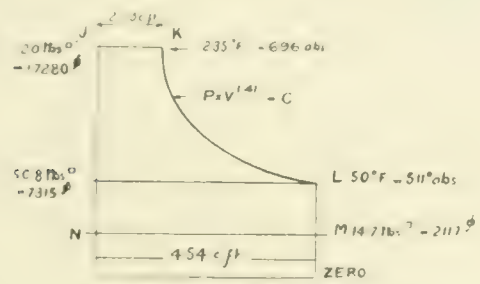


Fig. 2.

J. K. L. M. N. will represent the work obtained from the air.

The volume J. K. will be

$$\frac{1{\cdot}83 \times 696}{596} = 2{\cdot}13 \text{ c. ft.}$$

We will fix the temperature at end of expansion at L. as 50°F. to prevent any chance of freezing.

This will fix the ratio of expansion

$$V_2 = V_1 \left(\frac{T_1}{T_2}\right)^{2\cdot45} \text{ from which } V_2 = 4{\cdot}54.$$

$$\text{and } P_2 = P_1 \left(\frac{V_1}{V_2}\right)^{1\cdot41} \text{ from which } P_2 = 50{\cdot}8 \text{ lbs.}$$

The work done as per the diagram J. K. L. M. N. is 35,968 ft. lbs., equivalent to 46·5 B.T.U.

We have thus expended in the power cylinder 95·3 B.T.U. and obtained in the motor cylinder 46·5 B.T.U. an efficiency of about 48 °/₀. This efficiency would be improved if more heat were available for heating the air, which would be the case if other auxiliaries (such as the electric dynamo) were being run. As regards storage the compressed air system has many advantages, and suitable reservoirs are cheap to manufacture, and are not very bulky. When working the winches and windlass a large storage of power would not be necessary, as the auxiliary engine would run continuously when cargo was being dealt with. The engine would also be kept running when manœuvring, so that merely sufficient air would be required for an emergency manœuvre.

There remains the purely hydraulic system to consider, but as this is so very inefficient at low loads, it does not appear to offer any advantages. It is, however, not a flexible system, and there is the trouble of leading heavy pressure flow and return pipes in exposed positions on deck.

There would also be difficulties in designing a suitable reversing engine to do the manœuvring, and the storage accumulator would be bulky and inconvenient.

In conclusion, the writer has endeavoured to put before the meeting the various auxiliary systems in use and proposed and trusts that the discussion will elicit valuable information from those members who have had actual sea-going experience of similar auxiliaries.

NORTH-EAST COAST INSTITUTION OF ENGINEERS AND SHIPBUILDERS. GRADUATE SECTION. The 6th general meeting of the session was held on the 24th February. Mr. A. P. Patterson read a paper, illustrated with lantern slides, on "Vessels for carrying oil in bulk." The paper dealt with the cargo, general arrangement, hull structure, oil pipe leads and suctions, other pipe arrangements, ventilation, strength and stability.

MAN'S INHUMANITY TO MAN. A case brought before one of the London courts recently emphasizes the dangers arising from those who [illegible] A man in search of work, was [illegible] as to his right to work, he was further assaulted and maltreated. The right to apply for and [illegible] work in a free country, without being answerable to a challenge, whether rudely or civilly made, by a stranger, appears reasonable, but when in addition to a [illegible] there is a risk of this being [illegible] face to face with dangers that may lurk unseen, and it [illegible] that the authorities should deal with the worst [illegible] of hooliganism in a manner which will give [illegible] to all concerned. [illegible] seekers for work who had come [illegible] work, were pushed aside when work was [illegible] because they had been unable to pay the [illegible] and tramps were looking forward to the [illegible] The speech [illegible] by the press, was dealt with in a [illegible] by the Recorder when passing sentence of [illegible] on the assaulter; he [illegible] the type [illegible] to the country, who neither wanted to work nor to let others do so. He hoped [illegible] in this case [illegible] to strike [illegible] to be given that a [illegible] of such [illegible] It is hard to realize that [illegible] with [illegible] The [illegible] is at fault somewhere. [illegible] the Workmen's Compensation [illegible] the National Insurance Act be brought to bear [illegible] the responsibility for [illegible]?

COMBINED RECIPROCATING AND TURBINE ENGINES.*

WHILE the subject of this paper is "The best arrangement of combined reciprocating and turbine engines on steamships," it does not follow that the arrangement proposed by the author is the best. The Committee on Papers I presume would like to have the question discussed and it is quite possible that the presentation of the very worst arrangement may enable the Society to discover the best.

Amongst the many benefits to steam engineering that have resulted from the introduction of the modern forms of the steam turbine as a rival of the highest developed type of reciprocating engine, none is of more importance than the wider knowledge amongst engineers, that has come with the rapid introduction of the steam turbine, giving rise to conditions that must be met and satisfied by the reciprocating engine that is to use steam economically. Experience with the turbine has emphasized, not only the weak points of the reciprocating engine, but at the same time furnished like evidence of its own weak points.

It so happens that both types of steam engine have an economical and a wasteful end. In the turbine the steam begins its work in the wasteful end and finishes in the economical end, while in the reciprocating engine this is reversed. This condition, in the reciprocating engine, is largely due to functional causes: the alternate heating and cooling of the cylinders, caused by the drop in temperature as the steam expands and produces work—the difference in temperature being much greater in the low-pressure than in the high-pressure end—and the consequent condensation due to the heat abstracted from the steam to replace that lost in the low-pressure cylinder during the exhaust stroke. The thermal lines cross each other twice every revolution.

The turbine engine escapes this loss because the steam is continually moving in one direction on its way to the condenser and the cylinder, or casing, and the rotor maintains a temperature that corresponds with that of the steam at any point on its way to the condenser. Mechanically, however, the turbine is defective, as a certain amount of clearance must be allowed between the tips of the rotor blades and the casing and also between the tips of the guide blades and the rotor. As these blades, at the high-pressure end, are very short, and the clearance has to be as great there as elsewhere, the free passage for steam at the high-pressure end of the engine is quite considerable, especially in the marine type where the rotors are of greater diameter and the area of clearance correspondingly greater. Where the blade is only about one inch in length and with, say, ·05 inch or ·06 inch clearance, we have over ten per cent. of clear space for the steam to pass without doing work. At the low-pressure end, however, where the blades may be ten inches long, the same clearance would only be one per cent. The escaping steam at the high-pressure end is of course forced to do some work as its volume expands and the length of blade increases.

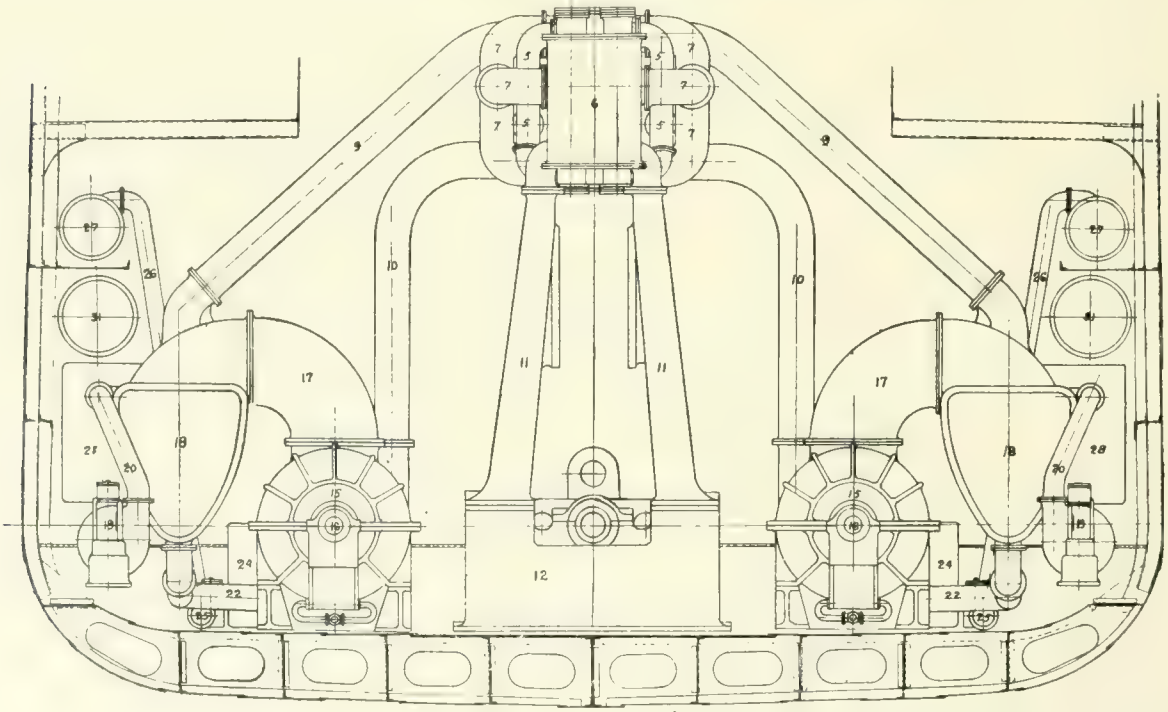
I have just been trying to compare the data on a set of indicator cards from a triple-expansion marine engine, the aggregate horse-power being 5600 divided as follows: high-pressure cylinder 1886 horse-power, intermediate-pressure cylinder 1874 horse-power, and low-pressure 1840 horse-power—these are sufficiently close to say that the power is divided equally among the three cylinders—with data from a marine turbine set consisting of a central high-pressure and two wing low-pressure turbines giving 5500 shaft horse-power, also practically divided evenly between the three shafts. No superheating in either case.

In the reciprocating engine, the first stage, or one-third of the total horse-power, is obtained by a drop in the pressure from 180 pounds absolute to 70 pounds absolute, being a drop of 110 pounds, corresponding to a drop in temperature from 372·9 to 302·9 or 70 degrees.

In the turbine engine, the first stage, or one-third of the total horse-power, is obtained by a drop in the pressure from 175 pounds absolute to 35 pounds absolute, being a drop of 140 pounds, corresponding to a drop in temperature from 370·8 to 259·3 or 111·5 degrees.

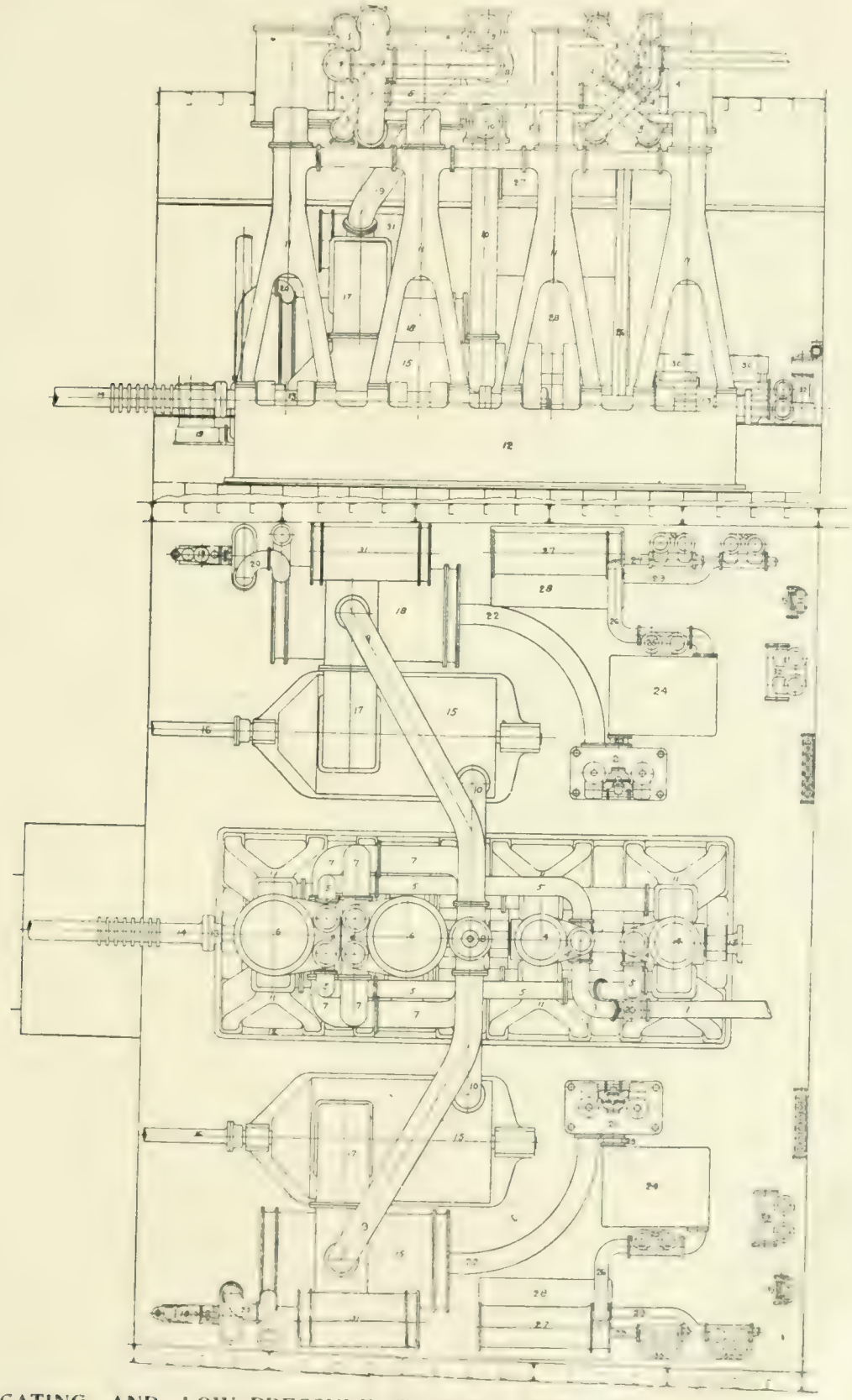
In the reciprocating engine, the second stage, or one-third of the total horse-power, is obtained by a drop in the pressure of 70 pounds absolute to 25 pounds absolute, being a drop of 45 pounds, corresponding to a drop in temperature from 302·9 to 240·1 or 62·8 degrees.

* Read before the Society of Naval Architects and Marine Engineers, New York, by G. W. Dickie, Esq., Member of Council.



PROPOSED ARRANGEMENT OF MARINE COMPOUND

(For explanation of numerals



RECIPROCATING AND LOW-PRESSURE TURBINE ENGINES.
see list on page 301.)

In the reciprocating engine the third or last stage is obtained by a drop in the pressure from 25 pounds absolute to 2 pounds absolute, being a drop of 23 pounds, corresponding to a drop in temperature from 241·1 to 127·26 or 113·84 degrees. The aggregate drop in pressure for the second and third stages, or two-thirds of the total horse-power, is from 70 pounds absolute to 2 pounds absolute, a drop of 68 pounds corresponding to a drop in temperature from 302·9 pounds, corresponding to a drop in temperature from 259·3 to 127·26 or 176·64 degrees.

In the turbine the second or last stage, or two-thirds of the total horse-power, is obtained by a drop in the pressure from 35 pounds, absolute to 1 pound absolute, being a drop of 34 to 102 or 157·3 degrees.

These pressures and temperatures are not given for the purpose of making any comparison between the economic performance of the reciprocating engine and the turbine, for as a whole their economy was practically the same. The consumption of fuel of like quality was practically the same per horse-power, with the advantage in favour of the turbine as between shaft and indicated horse-power; the volume of steam passing through the cylinders was practically the same as that passing through the rotors, yet 1880 horse-power, slightly over one-third of the total, was developed with a drop of pressure of 110 pounds corresponding to a drop in temperature of 70 degrees, consequently the mean temperature of the high-pressure cylinder, with its small surfaces, would be about 35 degrees below that of the entering steam. In the second stage, 1874 horse-power, slightly more than one-third, was developed with a drop of pressure of 45 pounds, corresponding to a drop in temperature of 62·8 degrees, consequently the mean temperature of the intermediate-pressure cylinder would be about 31·4 degrees below that of the entering steam. In the third stage, however, 1840 horse-power, 26 less than one-third, was developed with a drop of pressure of 23 pounds, corresponding to a drop in temperature of 113·84 degrees, consequently the mean temperature of the low-pressure cylinder would be 56·92 degrees below that of the entering steam, which, taken in connection with the larger surfaces, accounts for the great loss in the last stage. The intermediate cylinder being steam jacketed would indicate that considerable re-evaporation took place in that cylinder.

It is unfortunate that, if the exact point was known in the expansion of steam, where on the one side the economy would be with the reciprocating engine and on the other with the turbine, yet that point might not be the best place to make the division. There are other matters such as manœuvring with reciprocating engines, propeller design and desirable arrangement in the available engine room space, that may render the best arrangement for steam economy not the best for general economy.

I believe that the best result in steam consumption could be gained from having the terminal pressure for the reciprocating part of the engine power at or about 30 pounds absolute, or a little above the usual low-pressure receiver-pressure in triple-expansion engines. This is very far from that usually adopted as the best arrangement, everything considered.

The arrangement that has found favour with those responsible for the most important installations of power on board ship, where the two types of engine have been combined, has been that in which the steam has been expanded in the reciprocating engine down to a pressure of 9 or 10 pounds absolute. This would give a drop in temperature in the low-pressure cylinder of about 62 degrees, say a mean of 31 degrees below the temperature of the entering steam. This, I think, is far below the line where the economy of the turbine is superior to that of the reciprocating engine, and is undoubtedly the result of accepting as best the arrangement of two sets of reciprocating engines and one exhaust turbine between, the new White Star liners being notable examples of this arrangement. For very large installations of power there are several important advantages that attach to this arrangement. The size of the reciprocating engines is thus kept within reasonable limits. The manœuvring power is eighty per cent. of the total. A break down of the turbine engine leaves the whole manœuvring power intact, while a breakdown in one of the reciprocating engines still eaves seventy-five per cent. of the propelling power intact and forty per cent. of the manœuvring power available. There would also be what advantage can be claimed for twin screws for manœuvring.

Notwithstanding these important advantages claimed for the arrangement of two reciprocating engines and one turbine, I believe that better results, with installations up to 20,000 horse-power, can be secured by having one reciprocating engine on the centre line delivering steam to a turbine on each side at about 30 pounds absolute. This is slightly below the pressure that, in the regular three turbine set, the steam is usually delivered to the low-pressure turbine. This would admit of the centre line engine developing about 40 per cent. of the total power and, when exhausting straight to the condenser, at least 60 per cent. of the full power. The larger and most effective propeller would be on the centre line, where its efficiency would have the best propelling effect. The smaller side propellers would not require so wide projections from the side of the ship and would thus cause less disturbance to the water in the after run. With the large propeller in the centre, the side propellers could be run at a higher number of revolutions than would be advisable for the centre propeller were it turbine-driven. This would permit of the turbine rotors and casings being of a moderate diameter. In a 20,000 horse-power set of engines, with the centre line shaft making, say, 78 revolutions, I would have the side shafts running about 400 revolutions, which would give a diameter of about eight feet to the rotor. This would enable the turbines to be placed alongside the reciprocating engine in any merchant ship having that amount of power.

With the reciprocating engine closing its work with a terminal pressure of 30 pounds absolute, a simple compound engine would give satisfactory results. Where the total power was to be above 8,000, I would make the reciprocating engine with two high and two low-pressure cylinders, the high-pressure cranks being 180 degrees apart and the low-pressure cranks 180 degrees apart, each pair being 90 degrees apart, this would produce a well-balanced engine. Both pairs of cylinders would have piston valves, the valves for each pair being arranged so that one would take steam on the outside of the valve and the other on the inside. This would enable the valves for each set of cylinders to be operated by one valve gear, making an exceedingly simple marine engine. By a proper arrangement of exhaust from the low-pressure cylinders, only one change valve would be necessary. This would be operated by a direct steam cylinder, controlled by a hydraulic cylinder and piston so that the movement might be as slow as required. No steam jackets would be needed on the cylinders. The exhaust pipes, however, from the low-pressure cylinders to the turbines might be jacketed with advantage.

In such an arrangement there need be no objection to operating the air pumps, of which there would be two, through levers worked from the crossheads of the low-pressure cylinders. These pumps would be placed so that the foot valves would be as low down as possible, the channel way being in line with the lower face of the bedplate so as to be below the lowest part of the turbine casings, it being important to have them thoroughly drained. The dry-air pumps should be operated in the same manner as the wet-air pumps, being placed above the operating levers in a direct line with the wet pumps. The writer, however, would prefer to have the air pumps independent as shown on the sketch arrangement illustrating this paper, which would simplify the main engine and enable the turbines to be run without the reciprocating engine being in use. The feed pumps would be operated independently and thus remove another source of trouble from the main engine. In nearly all cases there would be room to install the main condensers on the outboard side of the turbines, so placed as to have the exhaust passage in the middle of the length of the condenser. The channel ways or connections to the wet-air pumps would pass through the lower part of the turbine casings and connect direct to the lower chambers of the pumps. As the turbines would not be as long fore and aft as the reciprocating engine, there would be plenty of room for all engine-room auxiliaries.

An outline of how such an arrangement would be installed for, say, 20,000 horse-power will accompany this paper. The dimensions of the various parts have not been worked out to meet any specific conditions, or to any refinement of accuracy, but are near enough to show how such an arrangement when perfected would look in place, the ship having a moulded breadth of 66 ft.

This arrangement admits of a cooler engine-room than can be obtained where the hottest parts of the machinery are in the wings and, in most cases, under deck. In the arrangement proposed by the writer the hottest parts of the machinery are directly under the casing that leads up through all the decks to the open air above.

(*To be continued.*)

Explanation of Numerals on Drawing.

1. Main steam pipe from boilers.
2. Main throttle valve for h.p. cylinders.
3. Steam pipe connection to after h.p. cylinder
4. Horse power steam chests and cylinders
5. Steam pipe connections from h.p. steam chests to L.P. steam chests
6. L.P. steam chests and cylinders.
7. Exhaust pipes from L.P. steam chests to change valve.
8. Change valve
9. Exhaust pipes from change valve to condensers
10. Exhaust pipes from change valve to L.P. turbines.
11. Reciprocating engine frames
12. Reciprocating engine bedplate
13. Crank shaft
14. Thrust shaft
15. Low-pressure turbines
16. Low-pressure turbine shafts.
17. Main exhausts from turbines to condensers.
18. Main condensers.
19. Main circulating pumps.
20. Circulating water pipes.
21. Main air pumps.
22. Suction pipes from condensers to air pumps.
23. Discharge from air pumps to hot well and filter tanks.
24. Hot well and filter tanks.
25. Hot well pumps.
26. Discharge pipes from hot well pumps to surface heaters
27. Surface heaters
28. Main feed tanks
29. Suction pipes from main feed tanks to main feed pumps
30. Main feed pumps.
31. Auxiliary condensers—pumps underneath
32. Bilge pumps.
33. Sanitary Pumps.

THE INSTITUTION OF ELECTRICAL ENGINEERS is forming a Western Local Section and the inaugural meeting will be held at Bristol on March 4th.

BRITISH CORPORATION.—The staff dinner in connection with The British Corporation was held in the Windsor Hotel, Glasgow, on February 3rd, presided over by Mr. J. Foster Ewing, who in responding to the toast of the evening, which was submitted by Mr. Thos. Tosh (superintendent, Messrs. Furness, Withy & Co.), reviewed the history of the Corporation and the developments since it was originated. The Corporation had just completed twenty-one years; its origin was largely due to the apparent need of safeguarding the interests of British shipowners by widening the area of control in connection with the load line. The official work of the Corporation had been largely instrumental in introducing a better system of dealing with ship construction under the load line act, interpreting its clauses with proper regard to the true value of strength and where to apply it. In gauging the methods of construction and the materials used the Corporation had carefully investigated the principles underlying the rules in force and had prepared a course of regulations which were based upon the results of this investigation, laying down standards of strength which had been accepted by the technical world, and had further been instrumental in leading to alterations in other classification societies. The chairman of the Corporation, Dr. Arch. Denny, was mainly responsible for the adoption of the rules by the General Committee and their success in practice had instilled the action taken, and the great value of the society to the shipping community has been [illegible] in many directions since its inauguration, and it was further developing its resources.

INTERNAL COMBUSTION MARINE MOTORS.

(*Continued from page 20.*)

Paraffin is a much more difficult fuel to vaporize than petrol, and the number of ways of using it are greater. Without going into the reasons for the difficulties it will be sufficient to state that after the fuel has been atomized heat is necessary for its vaporization. There are two methods used.

1. External vaporizers.
2. Utilizing the cylinder as a vaporizer.

The first method is sub-divided into (*a*) exhaust-heated vaporizers, (*b*) lamp-heated vaporizers, (*c*) combined lamp-heated and exhaust-heated vaporizers.

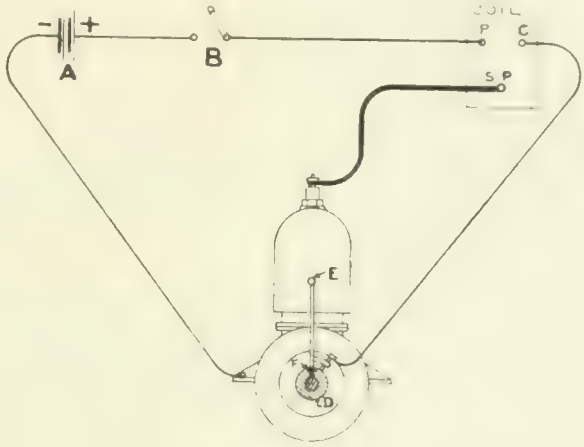


Fig. 8.

Broadly speaking, there is a carburettor similar in principle to a petrol carburettor, but instead of leading to the cylinder direct (in four-stroke motors) it is led into a chamber which is heated by the exhaust or by a lamp or by both exhaust and lamp.

Now as heat is required to vaporize the atomized paraffin, when an exhaust heated vaporizer is used, it is necessary to start on petrol and run that way for five to ten minutes. By means of a two-way cock it is possible, when the vaporizer is warmed, to switch over from petrol to paraffin. When an engine with an exhaust-heated vaporizer is running slow for any length of time, it is sometimes impossible to obtain sufficient heat to vaporize the fuel and for that reason a lamp is sometimes attached.

With a lamp-heated vaporizer it is usually possible to start away direct on paraffin, provided sufficient time is given to heat the vaporizing chamber.

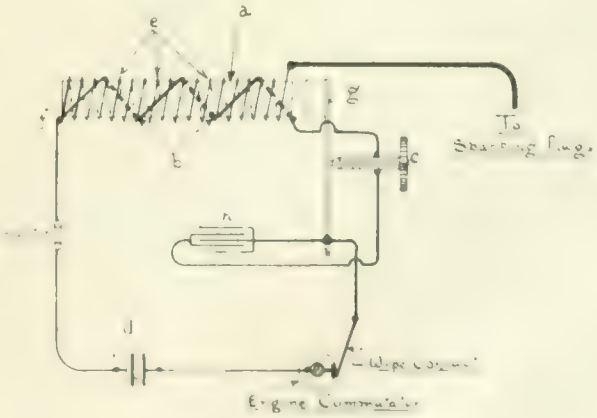


Fig. 9.

With the combined lamp and exhaust-heated vaporizer there is no need for petrol, as the conditions are similar to the lamp heated method at starting, and when running slow the lamp maintains sufficient heat to keep the vaporizer at the requisite temperature.

The above methods are for four stroke motors, and when paraffin is used for two stroke motors the inside of the cylinder is used as the vaporizer. When the cylinder is utilized pure air only is taken into the crank case and transferred to the cylinder; the oil is forced into the cylinder in the form of a fine spray, usually by means of a pump, just about the top of the stroke. This fine spray is vaporized by the heat of the cylinder added to the heat of compression, and generally there is a "hot pot" in the cylinder cover which fires the mixture. This point will be dealt with under ignition later on.

Crude oil is really more or less dangerous as it contains not only the heavy oils, but also the lighter oils, such as petrol. For this reason inflammable gases are given off at a low temperature. It is cheap and may come into use for large power in the course of time. It is always used in the way last described under paraffin.

There is also an oil called "crude," but also called "fuel" oil, which is coming in largely. It is not really a crude oil as some of the lighter spirits have been removed. It is used in the way last described, as, having most of the light spirits distilled out, it does not vaporize easily.

The ignition or firing of the mixture in internal combustion motors is done by (*a*) electrical means, (*b*) the heat of one explosion being conserved to fire the next charge, (*c*) the heat retained in the cylinder walls and the piston added to the heat of compression.

Dealing with the three systems in the above order, the electrical system is sub-divided into two classes, (1) high-tension ignition, (2) low-tension ignition. Without going into the theory of electricity it will be enough to set forth the various methods of electrical ignition. High-tension ignition, sometimes called wipe contact or jump spark, requires either a high-tension magneto or a coil and an accumulator. A high-tension magneto is rather an intricate machine which is driven off the motor by means of spur wheels or by a chain drive. To all intents a magneto is a small dynamo with two windings, a primary and a secondary, on the armature. At the point where a spark is required the current is broken in the primary and this induces a high-tension current in the secondary winding. There is a distributor which distributes the spark to the proper cylinder. Magnetos are machines which, when out of order, should be sent to the maker for repairs and adjustment. They have been brought to such a state of perfection, however, that trouble should be almost unknown. The sparking plug to which the high-tension wire is connected and where the spark inside the cylinder ignites the charge, will be described later on.

For coil and accumulator ignition the scheme of wiring for a single-cylinder motor is shown in Fig. 8.

A is the battery which is usually a storage battery composed of two cells, and when fully charged, giving about 4·2 volts across its terminals. Some firms have perfected dry cells for ignition work and these have many advantages. B is a switch connected on one side to the positive pole of the battery, and on the other side to the terminal of the coil which is marked P. There is another terminal of the coil which is marked C, which is connected to the contact maker on the engine. The negative side of the battery is connected to the engine frame. This completes the low-tension side of the equipment. The high-tension side of the equipment consists of one wire joining the terminal marked S.P. on the coil to the sparking plug on the cylinder head. The contact maker D on the engine is a fibre ring round the shaft into which is sunk a segment of brass F, which is in electrical connection with the shaft. The lower end of this lever presses on the fibre ring and when the brass segment passes under the end of the lever the electrical circuit is complete, being from battery terminal through switch, coil, lever E, segment of brass F, shaft, engine frame, back to battery terminal. This causes a spark or rather a number of sparks at the sparking plug, which ignites the charge. When the engine turns the segment from under the lever E the circuit is broken by the fibre ring and the sparks cease.

Considering the details of the scheme we have first the accumulator. This is usually of celluloid with lead plates connected to the terminals. Each cell has a positive and a negative plate and terminal. The voltage, when charged, is about 2·1 to 2·2 volts per cell, and as two cells are used generally for ignition the voltage of an accumulator is 4·2 to 4·4 volts across the terminals. They should not be allowed to run down too far; 3·75 volts should be made the low limit. Care must be taken to read the voltage whenever the engine is stopped, as the accumulator will "pick up" and show a false reading much in excess of the true voltage, after a short rest.

It is usual to couple up dry cells to give a higher voltage than 4·2 to 4·5. This is due to the fact that dry cells generally start at about 1·9 volts per cell, also they do not, as a rule, give out their charge so uniformly over a long period of discharge. The coil, the next piece of the ignition device, will be best understood from the sketch, Fig. 9.

a is an iron core round which is wound the primary coil *b*, composed of a few turns of large section wire; one end of *b* is attached to *c*, the set screw, and the other end connects to the battery *d*. The secondary, composed of many turns of fine wire shown at *e*, has one end grounded on *f*, a terminal, and the other end led from another terminal to the sparking plug in the cylinder. There is a piece of iron, attached to a spring, and marked *g*, which normally rests against *c*, and there is a condenser *h*.

When the primary circuit is closed by the segment in the commutator passing under the wipe contact, current flows from *d* through *b* and *c* to the spring on the back of *g*, from there through the terminal *k* to the wipe contact through the commutator, back to the battery. This magnetizes the iron core *a*, which attracts the iron hammer *g*, drawing it down and breaking the connection between *gk* and *c*. When the circuit is broken *a* is no longer a magnet, and *gk* springs back into contact with *c* and again completes the circuit. This action is, of course, exceedingly rapid. The creating and collapse of the magnetic field around *a* induces a current of high voltage in *e*. This causes a spark between points in the sparking plug, one point being connected to *e*, the other being in connection with the frame. The function of the condenser is to ensure that the magnetizing and demagnetizing of the core takes place suddenly. With a coil working properly there is really a shower of sparks every time contact is made on the engine. The entire apparatus of primary, secondary, coil and condenser are all packed in a small case, usually with the spring hammer and set screw on the top and three terminals coming through one side.

(*To be continued.*)

Society of Engineers.—The Council of the Society of Engineers (Incorporated) may award in 1912 two premiums of books or instruments to the value of £8 8s. and £4 4s., as first and second prizes respectively, for approved essays on the subject of "How to improve the Status of Engineers and Engineering, with special reference to Consulting Engineers." The Council reserve the right to withhold either or both of the premiums if the essays received are not of the required standard of merit. The competition is open to all, but application for detailed particulars should be made to the Secretary before entering. The last date for receiving essays is Friday, May 31st, 1912.

Lloyd's Register of Shipping.—The annual staff dinner of the Glasgow staff was held on February 17th. Professor Biles proposed the toast of "Lloyd's Register." Referring to the important position held in the commercial world by the society, he pointed out that confidence was given to the shipowner and the underwriter by the knowledge of the supervision extended by the surveyors over vessels which were classed. Lord Inverclyde replied, and stated that the new vessel *Selandia* had been undergoing trials of a very satisfactory character. Built at Copenhagen under the supervision of Lloyd's Register, she was the largest vessel yet fitted with Diesel engines. On her trials she had steamed 13 knots on a deadweight of 7,400 tons. Mr. Gardiner gave the toast "Shipbuilding and Engineering," which was responded to by Dr. John Inglis. Both speakers referred to the question of prices for the finished product of the shipbuilder and engineer, and the relation to the cost of material and labour, with the problem of how to increase wages without increasing the cost to the purchaser.

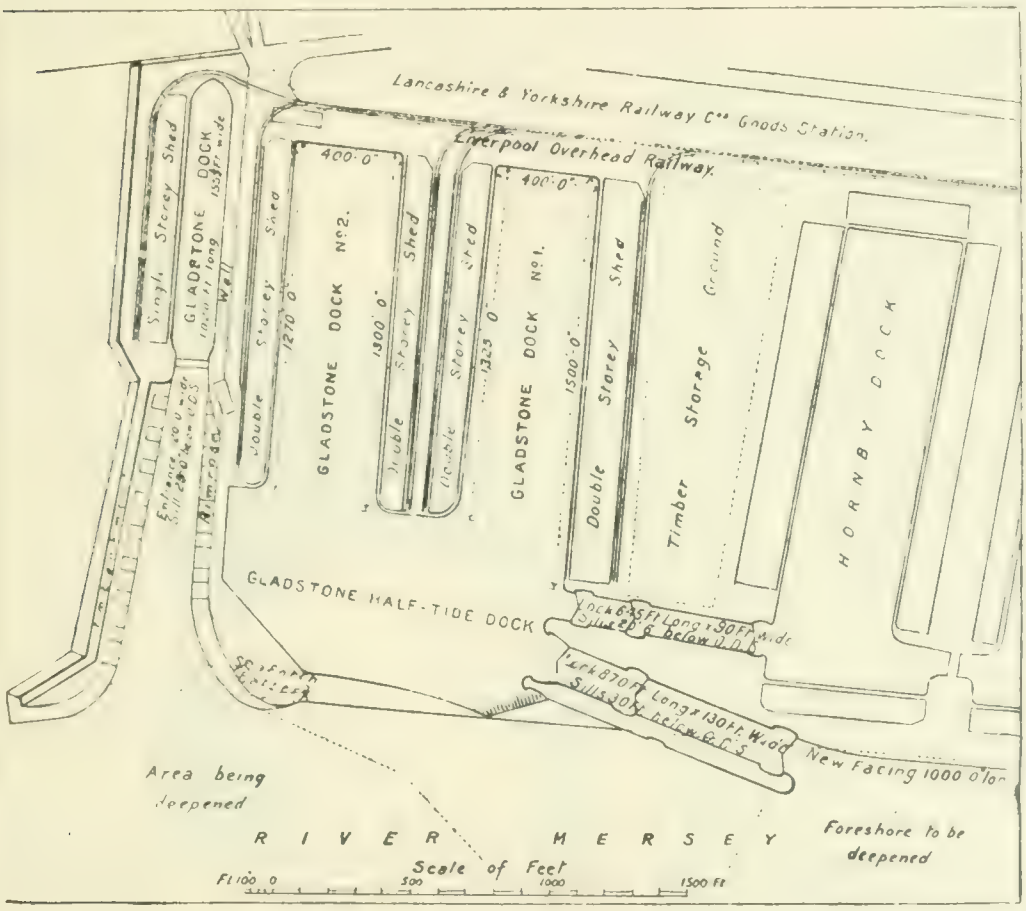
LIVERPOOL'S DOCK AND HARBOUR FACILITIES.

AT the annual dinner of the Liverpool Engineering Society, held recently, in responding to the toast of "The City Trade and Port of Liverpool," Mr. Helenus R. Robertson, chairman of the Mersey Docks and Harbour Board, made some interesting references to the trade of the Port and the new works now in progress in the Harbour. In the course of his remarks he stated that for the year ending July 1st, 17½ million tons of shipping had come into Liverpool or 35 million tons in and out. During 1910 the value of Liverpool's trade was £356,000,000, or 28½ per cent. of the total value of the trade of Great Britain.

Since dredging was commenced 236,000,000 tons of sand had been removed. It was, he remarked, all right for the shipbuilder to build such boats as the *Mauretania*, *Olympic*, *Aquitania* and the predicted 1,000 feet steamboat, but it threw a great strain upon those responsible for providing the accommodation for these boats. £3,000,000 would be spent upon the new scheme of improvement at the north end, and the Board were determined to preserve for Liverpool the position it held amongst the Ports of the world.

This scheme of improvement was proposed in May, 1908, but due to trade depression and other causes it has been postponed until the present. The following are the particulars of the scheme:—

A deep water approach will be constructed to take vessels of 1,000 feet length, also two branch docks, a lock 645 feet long connecting with the present Hornby Dock system. The river entrance lock will be 870 feet long, 130 feet wide, sill 30 feet below the old dock sill. The lock to Hornby Dock 645 feet long, 90 feet wide, sill 20½ feet below the old dock sill. The Gladstone or Half-tide Dock will be 14¾ acres. The Gladstone Branch Dock No. 1 will be 13 acres, having adjacent two-storey sheds with an area of 77,610 square yards. The No. 2 dock of the same name will be 12¼ acres, with similar sheds covering 56,888 square yards. The river entrance will be used for vessels up to 800 feet long by locking before and after high water. Vessels up to 1,000 feet will enter at high water, the depth of water over sill being 40 feet at neap tides. The lock to the Hornby Dock will afford connection to the Langton, Canada, Alexandria, Brocklebank and other docks. The new dock at present in course of construction to the north of these proposed new docks will enable vessels over 1,000 feet long to load and unload cargo and deal with coal, stores, etc., as in an ordinary wet or floating dock. The dock will have in addition the special feature of serving as a graving dock for the *Aquitania* or other large vessel when required, being provided with all necessary blocks, shores, etc., and with powerful pumps to empty its contents in a very short time. The dock is expected to be ready for the *Aquitania* eighteen months hence, and will cost £500,000. For the present it will have its own independent entrance from the river, but when the more comprehensive scheme now being started, is sufficiently advanced, the monster graving dock will form an integral part of the whole, and will be approached from the river by way of the great 130 feet lock entrance and half tide dock.



Plan of the New Works in hand by the Mersey Docks and Harbour Board. (See text).

SHIPS' COMPASSES.

THERE is little doubt that owing to the introduction some years ago of the Kelvin system of suspension of compass cards, the advantages and possibilities obtaining in the spirit suspension have been somewhat dwarfed or overlooked. However, the re-introduction of this type of compass into the British Navy has stimulated manufacturers in this matter and material difference now exists between the old types and those which are now being supplied. Illustrative of this we may draw attention to some of the prominent points which are brought out in the latest patterns put on the market by the well-known firm of Messrs. Henry Hughes & Son, Ltd., of Fenchurch Street, London, E.C.

In the first place a large card is employed which is clearly marked in points and degrees, and the upper section of the bowl is extended so as to allow a large clear space to be provided round the edge of the card. In the second place the needles of the card are specially arranged in the lower section of the bowl. Thirdly, a screw lifter is arranged on the edge of the compass verge to quickly raise the card and stone off the centre point, and fourthly a large oil chamber is provided underneath the bottom section of the bowl to counteract the oscillations of the ship.

Having summarised the improvements it may be useful to point out the advantages obtained thereby. A compass card is produced having maximum strength and size with a minimum amount of drag; a card with a virtually dead beat swing with the capacity of always returning to rest in a period of not longer than 60 secs.; a card having a quick and precise motion, and lastly a compass which is practically undisturbed by the pitching and tossing of the ship.

The new pattern of compass is being manufactured in all the usual stock sizes, and is capable of being lighted from either above or below. In order to facilitate the taking of bearings the inner edge of the bezel is divided into degrees.

It may be pointed out that one of the most important advantages of a spirit compass is its adaptability for the purpose of adjustment of the French system of using short soft iron bars placed beneath the bowl in substitution of the spherical correctors usually employed in a chart. In this direction Messrs. Hughes & Son, Ltd., have been making some experiments as to the last method of practically carrying out such adjustment, and we understand they are prepared to introduce this system of correction where required. In a number of tests made with different forms of spirit compass, it has been found possible to eliminate on land a considerable amount of deviation by the special arrangement of the needles of the compass case, and this condition will remain good on board ship, owing to the action of the soft iron bar correctors, so that a much simpler method of final adjustment can be effected on board ship.

INSTITUTE OF METALS. The annual autumn meeting will take place in London this year for the first time; the meeting will be held during the last week in September. The third May lecture will be delivered on 10th May by Sir J. A. Ewing, K.C.B., F.R.S., on the subject of "The Inner Structure of Simple Metals."

OIL-FIRED COCHRAN BOILER.

WITH the advent of cheaper oil as fuel and the coming of the internal combustion engine for marine purposes the question of burning liquid fuel in donkey boilers is becoming a serious one for consideration. Although the main engines of the ship may be of the internal combustion type, there are quite a number of directions in which it may be desirable or imperative to employ steam either as a motive fluid or a heat transmitting medium. Among some of the most important purposes may be mentioned the steering gear, whistle, donkey pumps for bilge and fire services, electric light machinery, distillers, steam heating apparatus, water ballast pump,

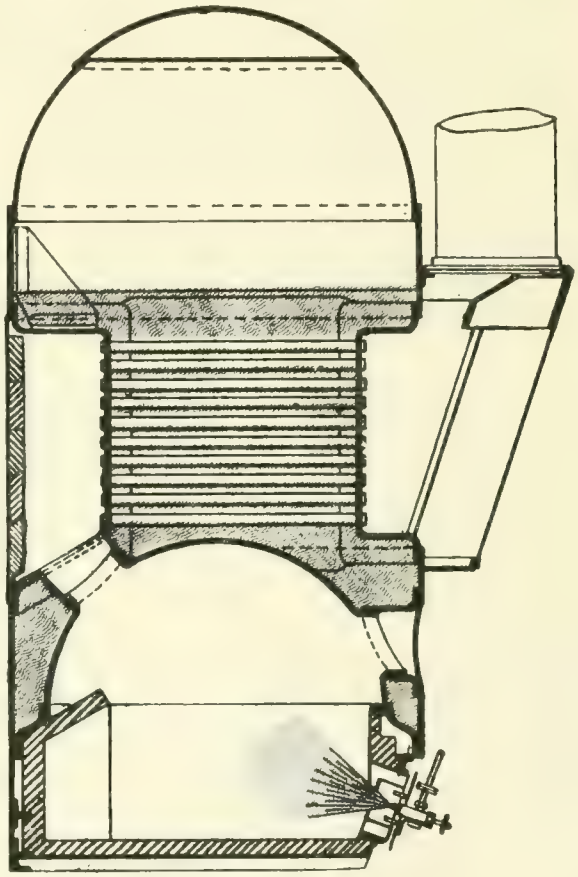


Fig. 1.

winches, windlass and ventilating apparatus in passenger vessels. Of these it may be said that the first six purposes are always required at sea while the remainder are only needed when the vessel is either near or in port. It would seem that in most cases a steam boiler must remain a necessity for dealing with some of the purposes enumerated.

We have pleasure in describing and illustrating one of the well-known Cochran boilers fitted with the Wallsend Howden patent system of oil burning. Fig. 1 shows a section of the boiler fitted with two burners, while Fig. 2 shows a battery of two boilers with the necessary apparatus for oil burning. This latter figure is sufficiently diagrammatic to enable a clear idea to be

obtained as to the detail arrangements without any extensive description, it being understood that the only feature not shown, is the main oil tank to which the suction pipe from the pump and the overflow pipe from the pump and main heater are taken. In this system the liquid fuel is injected into the furnace by means of a special oil-fuel pump in the shape of a conical spray of exceedingly fine particles, which burst into flame at a distance of six to eight inches from the nozzle.

The method of working may be described as follows:—The oil is drawn from the oil tanks by means of the steam pump and thence delivered to the main oil fuel heater, when it is heated to the required temperature by steam. After leaving the heater the oil is filtered by passing through a discharge strainer and from there it passes to the distribution valve box, and thence to the burner or burners. A circulating pipe is fitted between the distribution valve box and the oil pump suction so that the apparatus may be kept working and the oil heated without necessarily working the burners. An air vessel is provided on the oil-discharge pipe to maintain a constant pressure on the oil.

For getting up steam an auxiliary apparatus is supplied which obviates the necessity for using wood, coal or any fuel other than the oil itself when raising steam in the boiler. This apparatus consists of a small auxiliary oil heater which is heated by means of a naphtha burner supplied with fuel from the supply tank for auxiliary heater. A handle on the oil pump, or a small independent hand pump, enables the oil to be pumped to the auxiliary heater, thence to the discharge strainer and so to the burners. The oil burner and air inlet to the furnace are ingeniously designed, and the correct amount of air is easily regulated to suit the quantity of oil burned. Each of the oil-fuel spraying nozzles projects through a baffle plate on the front of the casing into an air trunk, having lateral openings at its outer end. The air trunk projects concentrically with a second air trunk carried by the front plate, and the annular space between the inner and outer air trunks is fitted with deflectors, constructed in such a manner as to give the air passing through it a spiral motion.

The apparatus when correctly adjusted is practically smokeless, and the fire tubes will not soot up. Owing to the absence of soot, and there being no ashes or fires to clean, the boiler will steam quite regularly for days together without any fluctuation in the amount of steam produced.

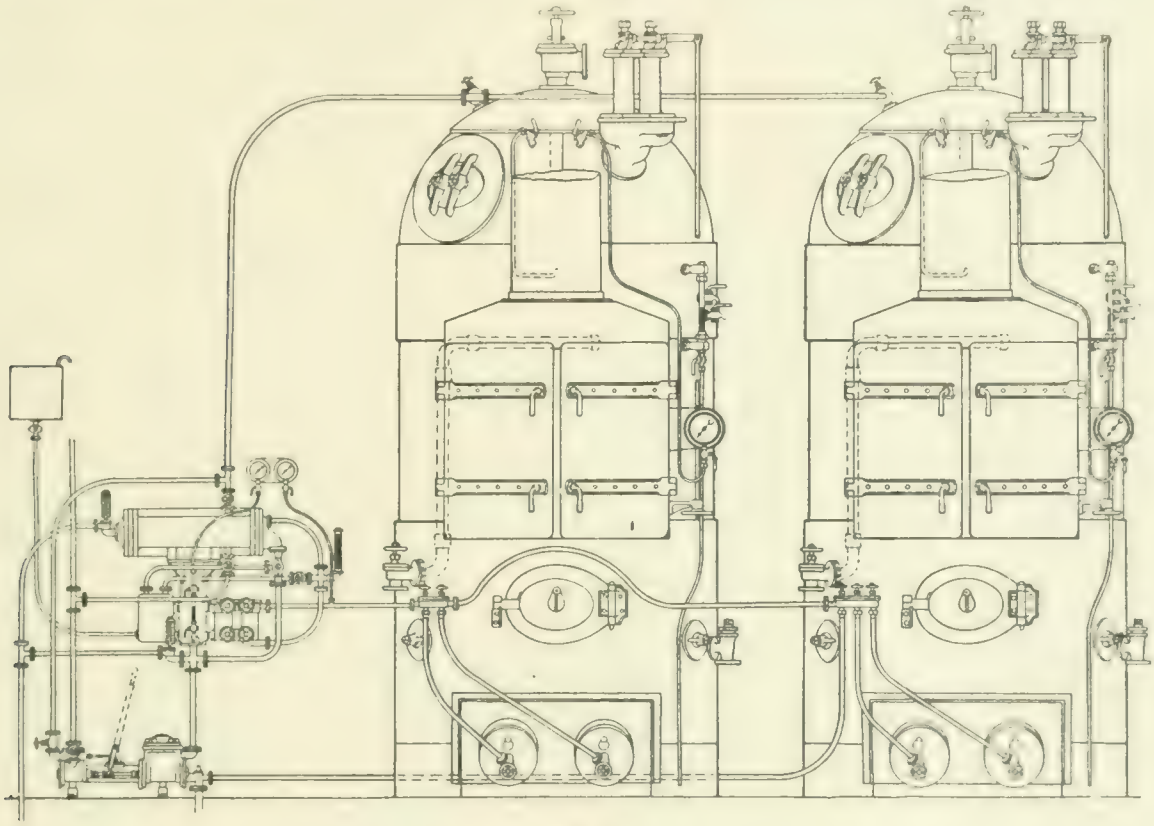


Fig. 2.

The evaporative efficiency of such a boiler so fired has been tested at the Wallsend Slipway, when it was shown that with a heating surface of 500 square feet and using an oil having a calorific value of 19,500 B.T.U. per lb., the water evaporated per lb. of oil per hour from and at 212°F. was 14·065 lbs. with feed water at 60°F.

Messrs. Bennett, Furness Company, Ltd., have appointed Mr. J. D. Ingall as Sectional Building Superintendent, Street, Somerset, their sole representative for the Bristol and Tewkesbury districts, in the sale of the Company's complex patent sectional boilers for engines and boilers. The Company will shortly remove their head offices to larger premises in 62, Robertson Street, Glasgow.

MARINE BOILER EXPLOSIONS.

From the Board of Trade Reports.

REPORT No. [illegible] deals with the explosion from a boiler on board the steam trawler *Ouse*. The explosion occurred on Thursday, the 10th November last when the vessel was about six miles N.E. of Aberdeen Harbour. No person was injured by the explosion. The boiler is made of steel, and is of the ordinary single-ended marine type, with two plain furnaces and separate combustion chambers. A hole about 1 in. long by about $\frac{3}{16}$ in. wide formed in the side of the starboard combustion chamber near the end of the furnace butt strap. Through this hole the contents of the boiler escaped into the stokehold. The explosion was due partly to wasting of the plate on the fire side caused by leakage from some adjacent rivets and from the end of the furnace butt strap, and partly to corrosion on the water side. The observations of the Engineer Surveyor-in-Chief are as follows:—A plate in the starboard combustion chamber of this boiler was so badly wasted, on both sides, that a hole was ultimately formed, through which the contents of the boiler escaped, and the feed pumps were unable to maintain the water level. As a consequence, the vessel was disabled and had to be towed into port. It is very important in vessels of this class with only one boiler, that it should be kept in good working condition, as, in the event of a breakdown, the vessel is at the mercy of the weather prevailing at the time, and those in charge of the machinery are not always competent to effect the necessary repairs.

Report No. 2094 deals with the explosion from a boiler on board the steam drifter *Energy*. The explosion occurred on the 2nd September last, when the vessel was in the North Sea, about 75 miles S. by E. from Aberdeen. No person was injured by the explosion. The boiler is made of steel, and is of the ordinary single-ended marine type, with two furnaces and separate combustion chambers. A hole, the size of which it has not been possible to ascertain, was formed in one of the plain tubes. The leak does not appear to have been serious at first, but it gradually increased until one of the fires was put out, and it became impossible to maintain the steam pressure and the water level in the boiler. The explosion was due to general corrosion on the water side of the tube, chiefly on the under side, in consequence of which it became so thin as to be no longer able to withstand the ordinary working pressure. The observations of the Engineer Surveyor-in-Chief are as follows:—A tube in this boiler was so badly corroded on the water side that a hole formed, small at first, but gradually increased in size until it was impossible to overtake, by the feed pumps, the escape of water. As a consequence, the vessel was disabled and had to be towed into port. The attendants do not appear to have been without warning, as several tubes had previously given trouble, and, upon examination, after the explosion, it was found that the whole of the tubes in the boiler were badly wasted and required to be renewed. The corrosion had been very rapid, as the tubes were only about five years old.

Report No. 2095 deals with the explosion from a boiler on board the steam drifter *Berry Castle*. The explosion occurred on the 28th September last, when the vessel was about 65 miles N.E. by N. from Cromer. No person was injured by the explosion. The boiler is made of steel, and is of the vertical type with water tubes placed above the fire box. It is 5 ft. external diameter, and 9 ft. 8½ in. in height. A hole about ½ in. by ¼ in. was formed on the inside of one of the stay tubes close to the lower tube plate, and through this opening the contents of the boiler escaped into the stokehold. The explosion was due to local corrosion on the water side of the stay tube, in consequence of which the tube became so thin that it could not withstand the ordinary working pressure in the boiler. The observations of the Engineer Surveyor-in-Chief are as follows:—This explosion was of a minor character, a hole forming in one of the tubes, due to local corrosion on the water side. The failure of the tube, however, rendered the boiler temporarily useless and caused the disablement of the vessel, which, under certain conditions, may be a serious matter. The vessel was towed into port, where repairs have been completed. Whenever any tubes are renewed in a boiler a thorough inspection of those remaining should always be made, as it is at such times that the best examination can be made.

PIONEER WORK IN STEAM NAVIGATION.

OCCASIONAL references have been made from time to time in our pages to the pioneer work done by engineers and others before navigation by steam was recognised as having passed the experimental stage. Papers read before the Institute of Marine Engineers have dealt more or less incidentally with the subject, and have also come under the observation of our readers. There is, however, one of the pioneers whose name has been as a household word on the eastern banks of the Forth and Clyde Canal, but whose work has not been so fully acknowledged and appreciated as it merits. According to a biography dedicated to David Napier by I. & W. H. Rankine, engineers, Falkirk, and published in 1862, William Symington, engineer, born at Leadhills, Lanarkshire, about 1765, was well educated at school and matriculated as a student at Edinburgh University. His bent was towards mechanics, and in 1786 he constructed a model steam carriage which was exhibited at Edinburgh. When the model was being shown, one of the visitors, Mr. Miller, who had been interesting himself in boats driven by manual power, applied to mechanical gear and paddle wheels, entered into conversation with the young engineer, with the result that it was pointed out to him how an engine similar to that on the carriage could be applied to the boat.

The commission to construct a suitable engine for a pleasure boat was given to Symington, and in 1788 it was fitted and the boat was seen steaming in Dalswinton Loch near Edinburgh. This was followed by a larger boat in 1789, the first to steam on the waters of the Forth and Clyde Canal, the speed attained being about 5 to 6 miles per hour. This venture was due to the co-operation of Miller with Symington, but with the expenditure of time and money without compensating advantage financially, thus giving to the country that advantage which sprang from their pioneer efforts and impoverishing themselves by their hard, enthusiastic interest in their work. Subsequently Lord Dundas, a landed proprietor who was deeply interested in the Forth and Clyde Canal, having seen the 1789 boat, desired Symington to construct a larger one. This was built at Grangemouth by Alex Hart and John Allan under Symington's supervision, the engine was constructed at the Carron Ironworks, some of the patterns being made by Mr. Jas. Blackie, also under Symington's superintendence. In 1801 the *Charlotte Dundas*, named after the daughter of Lord Dundas, was steaming on the Forth and Clyde Canal from Grangemouth to Glasgow, and was employed in towing small vessels bound from the Forth to the Clyde, the intention being to utilize steam tugs in place of horses. Lord Dundas discussed the question with the Duke of Bridgewater, who also favourably inclined, negotiated with Symington for some steam tugs for the Bridgewater Canal; however the fears of the other proprietors were expressed so strongly as to the damage which might be done to the banks that the negotiations were cancelled. The *Charlotte Dundas* was laid up in a siding of the canal near Falkirk, and Symington failed to recoup himself for his expenditure and left to his family poverty and to others the fruit of his labours and enterprise. The *Charlotte Dundas* was examined by Fulton on the occasion of whose visit Symington got up steam and had the boat running. Another visitor was Henry Bell, who afterwards had the *Comet* constructed and running on the Clyde in 1812, as set forth in the announcement to the public dated Helensburgh Baths, Aug. 5th, 1712. Fulton went to France and in 1903 is said to have constructed and tried his first steamboat on the Seine. He then proceeded to America, where the *Clermont* was constructed and the engines, made by Boulton and Watt, and based upon Symington's design, sent out to be fitted in 1806. From this date other vessels followed and then the industry grew. The first experiment which the Admiralty was persuaded to make was in 1819, when the *Hastings*, a 74-line of battleship, was towed by a steam vessel from Woolwich to Chatham, and then an order was given for a vessel 100 ft. long and 80 h.p., this, the first R.N. vessel, was also named the *Comet*.

The following verses are part of a poem composed by Muir, Kirkintilloch, dated March, 1802, on seeing the *Charlotte Dundas* on the canal towing two vessels fully laden.

Wharever by labour Forth and Clyde,
Were brought our Scotia's bile to tide
Inn come day, long and aide
Nae ony thought
Sic wonders wi'out sail or tide
Wad ever be wrought

Lo gar them trow that boats wad sail,
Thro' heads o' steam or 'tools o' kail
An' turn o'er glens their rudder tail,
Like weathercocks
Wes doctrin' that wad needed bail
Wi' common folk

They cal'd it nonsense—but at last
They saw boats travel east an' west
Wi' sails an' steamers at their mast
Syne without peelin'
They were convinced, the blust'rin' blast
Was worth the hearin'.

Lo! mony a year wi' little clatter
An' nae thing said about the matter
The horses hauled them thro' the water
Frae Forth to Clyde,
Or the navvies wi' weary splatter,
An' sweaty hide,

But little think we what's in noddles,
Wear science sits, an' grapes and guddles
Syne darklins forth frae drumly puddles
Brings things to view,
That the weak penetration fuddles
O' me an' you

For lately we hae seen a lighter,
An' at her end a fanner's flighter,
May and Lort laddies a' gae dight her
Black sooty vent;
Than hald a dozen horse she's wighter
By ten per cent

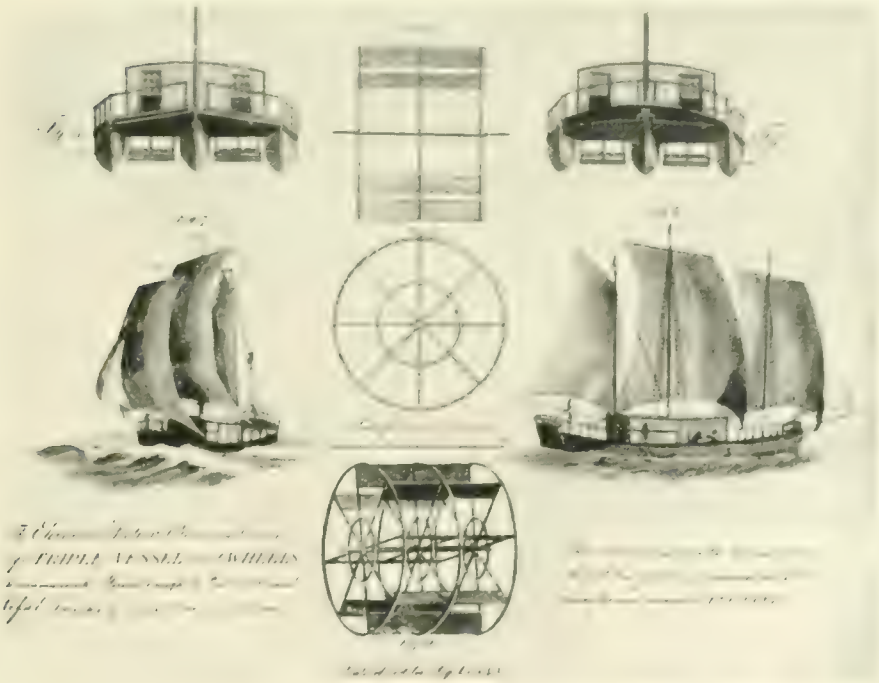
Wi something that the learned ca' steam
That drives it tangle the wankin beam,
O' huge engines to drain coal seam,
Or carry hutches;
She in her breast swalls sic a feam,
As has few matches.

The *Charlotte Dundas*, 1801. Built by Symington.

BATTLESHIP CRUISER "LION."—Copies of the picture may still be obtained from the publishers of this journal 1/3 each; signed artist's proofs 1/7 each. Size of print 25" in. by 12 in.

A new Company has been formed with the title Rennie, Forrestt Shipbuilding, Engineering and Dry Dock Co., Ltd., to acquire the business of Messrs. Forrestt & Co., Ltd., Wyvenhoe, and G. Rennie & Co., Greenwich, shipbuilders and engineers. Messrs. G. Rennie & Co., of Greenwich, have given notice that in about three weeks hence the Thames-side shipbuilding yard will be closed, and the business transferred to Wyvenhoe, Essex.

MESSRS. HARLAND & WOLFF, LTD., AT LIVERPOOL.—It is stated that the famous Belfast shipbuilding firm intend to establish large shiprepairing works at Liverpool, and that at a meeting of the Mersey Docks and Harbour Board held recently a lease for a long term was granted to Messrs. Harland & Wolff, Ltd., of the North Dock and Bootle. It is understood that the new works will be used chiefly for repairing and overhauling the firm's own vessels, and employment would be found for a large number of hands.



Miller's first boat, the *Edinburgh*, 1787.

THE "HOLME" CRANE PATENTS CO., Guildford Chambers, Lloyd Street, Manchester, have issued an illustrated brochure of their patent hatchway control gear for cranes describing both their electric and hydraulic gear. It is claimed that by the use of the gear the discharge and loading of vessels is made cheaper and more rapid and accidents to workmen and damage to cargo eliminated. The gear can be fitted to all existing hydraulic and electric cranes and to all new cranes of either type and operates lifting, slewing, luffing and travelling gear. The Manchester Ship Canal Co. have placed orders for some eighty gears and orders have also been received among others from the British Admiralty, Port of London Authority, the Bombay Harbour Trust, Messrs. Sir W. G. Armstrong Whitworth & Co., Ltd., who manufacture under licence from the Holme Co., are prepared to supply demonstrative [illegible]

FOREIGN NOTES.

Austria.

THE Naval programme requires that by 1915 there is to be provided four battleships of the first class, three cruisers of high speed, six torpedo boat destroyers, twelve torpedo boats, and six submarine boats.

The further development of the Austrian fleet is rapidly proceeding, and many vessels are already in hand at the various shipyards. The Danubius Company at Fiume has the order for a fourth Dreadnought, and the keel plates for this vessel have just been laid. It is to have a turbine steam plant of 26,000 h.p.

France.

A very large fishing steam craft, *Norvège*, is now building at a shipyard of Boulogne for a French fishing firm. The *Norvège* is to ply near Iceland during the months February to June, from July to October near New Zealand, and from October to the end of January off the coast of Morocco.

The two mail steamers which the Etudes and Navigation Company has ordered have the following items, *viz.*: Lengths 175 metres, beam 19.54 metres, with a displacement of 15,000 tons. Reciprocating engines and a turbine of the Parsons type will be provided. The contract speed is 20.5 knots. The two vessels are being built under the regulations of the Bureau Veritas, and up-to-date accommodation for a total of 1052 passengers is arranged for. A third similar steamer is to be ordered as soon as the above two have been delivered.

Germany.

The Hamburg-South America Steamship Company has just completed the fortieth year of its foundation, which was undertaken by eleven Hamburg merchants in the year 1871. It started with a capital of £3,000,000 with three small steamers and now its fleet consists of 48 ocean steamers, besides a large number of auxiliary craft of tugs, launches, etc. Its business has been evidently prosperous, as for the year 1911 it distributes a dividend of 10 per cent.

The Hamburg passenger and cargo steamer, *Erna,* of 3476 tons gross and 2173 net register, built in 1890, has been acquired by a firm in Scotland, and a second steamer, the *Hermann Menzel,* has been sold to a Newcastle shipping firm. Another Hamburg steamer has also changed hands and been purchased by a whaling company in Norway.

The *Dusseldorf* was launched lately at Bremerhaven. She is 142 metres long, with 17.4 in beam, with a carrying capacity of 9600 tons. There are 15 derricks and 15 powerful steam winches provided to deal with the cargo, with a lifting power of 15 to 25 tons. She is fitted with all modern equipments.

Her triple expansion engines develop 3750 i.h.p., and the speed of the vessel will be 12 knots. Two sister ships are also in course of construction with the same builders.

The *Sikh* has latterly been purchased by the Hamburg America Line. This steamer was built in 1903 and has carrying capacity for 3231 tons.

There is great activity in the construction of motors for marine purposes, some of the orders are mentioned here, namely: 2 motors, 1000 h.p., each, being constructed by the Maschinenfabrik Augsburg-Nürnberg A.G., for a vessel of the Woermann Line; 2 motors of 1500 h.p. each for the Hapag Co.; 1 motor of 6000 h.p., intended for a war vessel; 4 six-cylinder motors of 1150 h.p. each for two steamers of the German American Petroleum Company, at the Germania Yard; 2 motors of 1750 h.p. for a petroleum steamer of 14,000 tons; 8 motors of 850 h.p. for German Submarines; 2 motors for a steamer of 6500 tons for the Hapag Company; 1 motor of 1800 h.p. for a German Petroleum Company; 2 motors of 1500 h.p. for two new steamers by the Tecklenborg Company. In addition a large number of smaller motors are in course of construction for craft of smaller dimensions.

The Hamburg America Line has placed an order with a Bremerhaven Yard for an ocean liner for the South American service. The vessel is to have a high speed and to have up-to-date equipment.

An order for a steamer of 12,000 tons has been placed with the Vulcan Yard at Vegesack by the Hamburg South American Shipping Company, and another steamer of 18,000 tons with a Hamburg firm for the same Company.

A steamer of 17,000 tons has been ordered from the Vulcan Yard at Stettin by the United Shipping Company for the American Line, Christiansand New York route.

Two steamers of 8000 tons have been ordered from the Reiskners Yard by the Siberia Line for Far East service.

Portugal.

It is reported that an Arsenal is to be established at Lisbon, and that the intended formation of a fleet is to be carried out by inviting tenders from foreign firms, but rumour has it that the new warships will probably be built by British firms.

U.S.A.

It has been decided by the Marine Authorities to provide all war vessels with Aeroplanes in order to enable them to reconnoitre more advantageously. The type to be introduced is said to facilitate the rising of the aeroplane into the air from the deck. The aircraft is to be fitted with light pontoons so that the danger in flights over sea is much reduced. The success of the new aeroplanes is looked forward to with great confidence.

Argentine Republic.

The last of the four destroyers, *San Juan,* which had been ordered in France has just been launched at Bordeaux. The destroyer was built at the shipyard of Dyle & Bacalan, and has the following chief dimensions, *viz.*: Length 88.0 metres, beam 8.6 m., and draught 3.0 m. The displacement is 1000 tons, and the vessel will have a speed of 32 knots; the engines develop 18,000 h.p. She is provided with 4 steam boilers for coal and one for oil fuel.

Holland.

The Steamship Company, "Rotterdam-sohe Lloyd," has placed a new steamer, the *Merauke,* in its Dutch Indian service for passenger and cargo purposes. The *Merauke* is 131.00 metres long, the beam 17.9 m., and the carrying capacity is 8500 tons. There are 7 derricks and 13 steam winches for handling of cargo. The *Merauke* has a speed of 12½ sea miles, and is a modern ship in every sense of the word. The vessel is to enter on her duties as soon as possible.

The Holland America Line has placed an order for a 32,000 ton steamship at Belfast for its Holland America service. The new steamer is to be 225.55 m. long with a beam of 26.2 m., and a depth of 14.6 m., and the speed is to be 17 sea miles. The ship will have accommodation for 3600 passengers, of which 700 will be first, 600 second and 2300 third class. This new steamer is to be ready in the spring of 1914.

Norway.

A new plan for the building of the projected fleet has been established, the following vessels being suggested:—8 armoured vessels for coast defence, 6 torpedo destroyers, 40 torpedo boats, 12 submarines, 4 gunboats or 4 auxiliary vessels equipped with guns, a high speed mine layer, and in addition a number of auxiliary craft armed with guns to protect the mine layers, and also several mine searchers. It is further intended to construct a smaller type of submarine boat to guard the coast at special localities, and to support the forts on the coast.

Turkey.

The first of an order for four gunboats for coast defence, placed with the Chantier St. Nazaire, has just been launched successfully. The vessel has a length of 54.5 metres, beam 5.5 m., and with a draft of 2.46 m., the displacement is 510 tons. The engines develop 1025 h.p., and give the vessel a speed of 14 knots.

HYDROPLANES FOR THE NAVY. The First Lord of the Admiralty recently stated in the House of Commons that it is intended to develop the hydro-aeroplane or some other form of aerial vessel for the Navy.

MESSRS. W. J. FRASER & CO., LTD., owing to the termination of their lease at 98, Commercial Road, London, are moving their offices to the works of the Company at Dagenham, Essex, where a new engineering factory on the latest principles has been erected. All communications, therefore in future should be addressed to them at Dagenham, Essex.

MARINE MOTOR NOTES.

IN our Marine Motor Notes in January issue reference was made to the decision come to by Glasgow owners to adopt two-cycle oil engines of about 60 h.p. for new vessels then on order for coasting and canal traffic through the Forth and Clyde Canal. It was also stated that other similar vessels would probably follow for the same trade.

The Coasting Motor Shipping Company (John M. Patton, manager) have as a matter of fact placed orders for no fewer than fourteen vessels, a number of which are already under way. The major part of this building programme has been entrusted to Messrs. Peter MacGregor & Sons, Kirkintilloch, who will build eight vessels, each of 140 tons carrying capacity, 67 ft. long overall, 18 ft. 3 in. beam and 9 ft. 6 in. depth. The motor machinery will be of 60 b.h.p., three vessels having the Bolinders direct reversible motor, four having the Kromhout, and one the Beardmore-Diesel, supplied by Messrs. Wm. Beardmore & Co., Dalmuir. Each vessel will have two fuel tanks of 500 gallons capacity.

The Marquis of Graham's Oil-Engined Yacht *Mairi* on the Thames.

Length overall, 85 ft. 3 in., beam 13 ft. 6 in., depth 8 ft. moulded. Power, 120 h.p. Speed, 10 knots.

Designed and engined by Messrs. Wm. Beardmore & Co., built by Messrs. Ritchie, Graham & Milne, Whiteinch.

Reproduced from a photograph kindly lent by Mr. D. D. Walker, of Messrs. Beardmore & Co., Ltd., Naval Construction Works, Dalmuir.

Two of the vessels are being built by Messrs. John Cran and Co., Leith, these being of 230 tons carrying capacity, 98 ft. long overall, 18 ft. 6 in. beam, 9 ft. 6 in. moulded depth. Their load draught will be 6 ft. 8 in., and each will have a motor of 120 b.h.p., one being a Bolinders and the other a Beardmore Diesel, and tank capacity for 1,600 gallons of oil fuel. Two other vessels, slightly larger, are being constructed by Messrs. A. Jeffrey & Co., Alloa. These are each to be of 260 tons carrying capacity, 99 ft. 8 in. in length overall, 28 ft. 9 in. beam, 9 ft. 6 in. moulded depth, and have a Beardmore Diesel motor of 120 b.h.p. and fuel capacity for 1,800 gallons.

Messrs. William Chalmers & Co., Rutherglen, have been entrusted with the two vessels remaining to be noticed, which are the largest. The carrying capacity in their case is about 370 tons on a draught of 9 ft. 6 in., the length overall being 115 ft., breadth 22 ft. 6 in., and moulded depth 10 ft. 6 in. Each will be fitted with a Diesel engine of 160 b.h.p. supplied by Messrs. Beardmore & Co., and have fuel capacity for 2,200 gallons of oil fuel.

Of the fourteen vessels for all have oil motor engines of 2 ton capacity by Messrs. Clarke, Chapman & Co., Gateshead, and four on motor wagons of the same capacity by Messrs. Brazil, Straker & Co., Bristol. The vessels are all being constructed to the classification of the Lloyd's Corporation Registry.

The fourteen vessels are all single-screw, and the supplies of fuel for the several powers and capacities are all designed for about three weeks of ordinary running at speeds varying from 8½ to 10 knots, without replenishing the tanks.

The motor barge *Ingwerdi*, about 65 ft. long, fitted with a 30 h.p. Bolinders engine, which left Weymouth in December last for Brazil, has reached her destination after a voyage of about thirty-three days. The performance has thus been fully completed, supplying proof of the reliability of the internal combustion engine for heavy sea work. She was built for the carriage of [illegible] and grain to pay from the coast up river. The [illegible] vessel, about [illegible] ft. long, built for the East and fitted with Diesel engines, was recently, in the course of her voyaging in the Thames, and excited sufficient interest to call visitors to see her with a view to information as to reliability of the engines and running costs. Proceeding to the Tyne, she was again looked upon as a noteworthy vessel, and of a type likely to be profitable and less liable to be engaged under the distraction of labour troubles, owing to the composition of the crew, an element in connection with oil or coal gas engines which was remarked upon by the Marquis of Graham in his presidential address to the Institute of Marine Engineers on February 13th. On that occasion he extended an invitation to those present to inspect his oil-engined yacht *Mairi* and have a run on the Thames, an invitation which many accepted, and by arrangement a party of ten were received on board and had the experience of seeing the engines at work for about an hour. The engines give great satisfaction on the passage to Dorchester and the Clyde. A combination of the pleasure and convenience in a prescribed maximum draught of water is not easy of accomplishment, but Messrs. Beardmore have [illegible] serviceable for both purposes. The boat is [illegible] ft. long, fitted with twin screws to give a speed of 13 miles per hour. Another combination, a Parsons 45 h.p. motor in a 36-ft. boat, is specially adapted for towing purposes for the West Coast of Africa. Messrs. Burnett & Wain have had a builders' trial run of the *Sylvia*, the official trials are now also run satisfactorily, being in advance of Messrs. Barclay, Curle & Co. with the *Julia*. Messrs. Parsons, Southampton, give in their catalogue many interesting illustrations of types of vessels, from [illegible] ft. long to launches of various kinds, [illegible] yachts and cruisers. Included in these are vessels for the Continents of Europe, Asia and Africa, as well as for the British coast lines. The choice of a standard engine is an important consideration and having been made on the basis of carefully noted experience and reports from customers, backed by repeat orders, the Standard can be supplied with advantage to manufacturer and customer. Messrs. Parsons have reached the assurance in the type of engine made during 1911, and their output and orders have materially increased.

OIL STEAMSHIPS.

DURING the last week in February contracts were completed for the building of no fewer than twenty-one oil-tank steamships of large dimensions, which will be adapted for the conveyance of coal or oil. Several of the vessels are for American owners. The whole of the contracts have been placed on the North East Coast, and nineteen of them have been apportioned as follows: [illegible] Sir W. G. Armstrong, Whitworth & Co., two of 15,000 and one of [illegible] tons respectively; Messrs. Swan, Hunter & Wigham Richardson, Ltd., [illegible] and four of [illegible] tons capacity; Messrs. [illegible] Shipbuilding and [illegible] Ltd., two of [illegible] and one of [illegible] tons capacity; Messrs. W. Doxford & Sons, Ltd., [illegible] and [illegible] tons capacity.

REVIEWS.

The Steam Turbine. By Mr. Robert M. Neilson. London: Messrs. Longmans, Green & Co. Reissue with additions, price 6s.

MR. Neilson's well known book was first published in 1902, and 2nd, 3rd and 4th editions followed in 1903, 1904 and 1908 respectively. The volume under notice is a reissue of the 4th edition with additions made therein. The important developments in the design and employment of steam turbines during the last three years, while not by any means rendering the 4th edition useless, have made it desirable to add an appendix. This the author has set himself to do, and in appendix III., which is a lengthy one, we find the later developments of the steam turbine dealt with. This portion of the work in common with the rest of the volume is illustrated, and contains a large plate showing the arrangement of the machinery in the *Olympic*. A diagram of steam consumption of modern turbo-generators has been prepared from recent and reliable data, and inserted in the volume, and opportunity has been taken to extend the patent lists in Appendix II. to include the last complete year of published specifications. The whole volume is extremely well produced, and forms a most readable and instructive book on the subject.

The Engineers' Year Book. By Mr. H. R. Kempe. London: Messrs. Crosby Lockwood & Son. Price 10/6. THE 1912 Edition of this Year Book comprises 1460 pages, and has over 1200 illustrations. It has been much enlarged, corrected and brought up-to-date, and forms a compendium of the modern practice of civil, mechanical, electrical, marine, gas and mine engineering. Perhaps there is no professional man who requires a year book more than the engineer of the present day, and that being so he has at hand a practical and authoritative reference book on every branch of engineering, in the volume under review. All the sections in the volume have been subjected to a careful survey, and special reference may be drawn to the sections: "Refrigerating Machinery," "Harbour and Dock Engineering," "Naval Architecture and Marine Engineering," "Lubricants and Lubricants," which contain much valuable information. All the sections are written by well-known men. The Formulæ, Rules, Tables and Data are of the greatest use, and the volume can be strongly recommended to the notice of all engineers.

Rhodes Directory of Passenger Steamers for 1912. Price 2/6. London. Messrs. George Philip & Son, Ltd. YEAR by year this volume increases in size, and as its name implies is a book giving particulars of all passenger steamers afloat. A list of the steamship companies is first given with the names of the vessels forming the fleet, and then the names of the steamers follow, arranged in alphabetical order. The information given in this section is very complete, and thus makes the volume an excellent reference book. A feature of the volume is a number of full page illustrations of recent passenger vessels.

CORRESPONDENCE.

We do not hold ourselves responsible for the opinions expressed by our correspondents.

To the Editor of THE MARINE ENGINEER AND NAVAL ARCHITECT.

Dear Sir,—My attention has been called to a memorandum recently circulated and which was also made public in your columns in your January number, setting forth certain startling statements of the Royal Navy. As an engineer myself, I feel it is my duty to call the attention of the engineers of the mercantile marine to what they may expect should they avail themselves of the questionable liberal and generous (?) offers set forth in the Artificer Reserve, which was formulated some years back and which I regret to say was expounded in the *Liverpool Journal of Commerce* at that time. It was not sufficient that the Admiralty should deprive the marine engineering profession of the opportunities of adding to the efficiency of their country's defence by closing the lists of the engineering officer Royal Naval Reserve and substituting that of an Artificer Reserve, in which they expected certificated engineers of the mercantile marine to respond to. This in itself was to say the least a slight upon those whose efforts add largely to the wealth of the country and from whose ranks have emanated a large proportion of the remarkable developments of marine engineering, and by their adoption in the Navy have added not a little to its efficiency. But that they should add additional hardship, in the form of placing over Royal Naval Reserve engine room artificers such men as stokers, whose only qualifications are long service, manipulating coal, etc., in a more or less efficient manner, and two years' special training whatever that may be, is hardly credible. If this is the all in all of the wonderful scheme of which we have heard so much in connection with the efficiency of the Navy, I think one can safely venture to predict that should that unfortunate time arrive, which we all hope is far remote, the engine room of the nation's first line of defence will be found sadly wanting. Yours truly,

A. E. BATTLE.

Newlyn House, Aldgate High Street, London, E.C.,
21-2-1912.

ANSWERS TO CORRESPONDENTS.

A. W. B. *With the high pressures and patent metallic packings now in vogue, is it modern practice to grind the piston rods after turning?*

The question of cleaning up piston and other rods to the finest possible finish in order to give a perfectly smooth surface for the packing and reduce friction, is one which involves cost, and in many cases the rods are so finished, but in the majority of engines built, the steadiness of the lathe and the fine finishing cut are relied upon to deal with the rods.

In a collision between a "Man-of-war" and a "Merchantman" and the court finds the "Man-of-war" to blame, is the Admiralty responsible for the damages, or do they hold the commander of the ship responsible; also do the owners of the merchant ship sue the Admiralty direct, or through the commander?

The answer to our correspondent's query is based on the theory that the King is the fountain of justice. All courts of law in this country are the King's Courts, and it is not consistent with the dignity of a monarch that he should be sued in his own courts by any of his subjects. Thus the King cannot be sued for damages sustained through the alleged default in navigation of a man-of-war. Nor can the Lords Commissioners of the Admiralty. For they are the King's servants, and have the right to shelter themselves behind the Royal Prerogative when sued in respect of acts done in their official capacity. But it is contrary to the public sense of justice that those who have sustained an injury should be deprived of their legal remedy and accordingly the practice has arisen for those interested in vessels which have been in collision with King's ships to sue the commanders of such ships. On these occasions the commander of the warship does not set up any defence as to his exemption from liability as being a King's servant; the Admiralty provides the legal advice and retains its own counsel for his defence, and, if the King's ship be found in default, though the commander is nominally cast in damages and costs, the money paid to the successful claimant comes in fact out of the public purse, the commander being only defendant in name.

BOOKS AND CATALOGUES RECEIVED.

Diesel Engines for Land and Marine Work. By Mr. A. P. Chalkley, with an introductory chapter by Dr. Rudolf Diesel. London, Messrs. Constable & Co. Price 8/6.

A.B.C. of Hydrodynamics, by Lt.-Col. R. de Villamil, R.Eng. (Retired). London, Messrs. E. & F. N. Spon. Price 6/-.

Radio-Telegraphist's Guide and Log-book, by Mr. W. H. Marchant. London, Messrs. Whittaker & Co.

Electric Propulsion of Ships, by Mr. H. M. Hobart, M.I.C.E. London, Messrs. Harper & Bros. Price 5/-.

Messrs. Bassett-Lowke Ltd., the well-known model engineers of High Holborn have recently issued a really [illegible] catalogue of model boats and fittings. The list comprises everything from the smallest fitting to the finished article and will appeal strongly to all model enthusiasts. Illustrated pictures of yachts, steamers, liners, cargo boats, all types of marine engines and auxiliary machinery are to be found in the catalogue, and those interested will do well to get into touch with the firm.

The New York Belting and Packing Co., Ltd., of 11 and 13, Southampton Row, W.C., have issued a revised engineers' catalogue illustrating and describing the packings manufactured by them. The Company have been manufacturers of [illegible] of goods since 1892, and have high grade packings for all services, low, intermediate, high-pressure and superheated steam, the most important being dealt with in the catalogue. The Company will send a copy of the catalogue on request.

The Thorn & Hoddle Acetylene Co., Ltd., of 151, Victoria Street, S.W., have issued a booklet on their "Incanto" oxy-acetylene system of autogenous welding and cutting. The booklet contains particulars of some very portable welding and cutting plants recently introduced by the Company. They state that acetylene generated in the "Incanto" plants costs not more than 3d. per c.f.

"The Care of Belting" is the title of a little book issued by Messrs. Wallach Bros., Ltd., of Royal London House, Finsbury, E.C., which gives many hints on the care of belting and is very readable and instructive. The Company's specialties are also dealt with in the book. Those interested should send for a copy.

We have received from **The Hoyt Metal Company of Great Britain, Ltd.,** 26, Billiter Street, E.C., a small commemorative memorandum and booklet of their products. Various grades of metal are mentioned in the catalogue, including the I.C.E. (internal combustion engine) lining metal, recommended for internal combustion and high-speed engines, etc.

OBITUARY.

Mr. Thomas Anderson.

It is with the deepest regret that we have to chronicle the death of Mr. Thomas Anderson which occurred at his residence in Liverpool after a brief illness on January 31st. Our close association with him as a Director of the Company owning this journal, has enabled us to appreciate his excellent qualities both as an engineer and a keen man of business, whose sound judgment was of the greatest assistance to those who were privileged to be associated with him in commercial matters.

Mr. Anderson was the head of the firm of Messrs. Thomas Anderson, Ltd., consulting engineers, of Liverpool, Manchester, Barrow and Belfast. He was elected in January, 1889, one of the founder members of the Institute of Marine Engineers, being at that time Chief Engineer of the s.s. *Garonne* belonging to the Orient Line. He was a Vice-President of the Institute for the year 1895.

Mr. Anderson was the son of the late Mr. Robert Anderson, millwright, Langholm, Dumfriesshire, was born in 1848 and educated at Langholm Academy. His business life commenced under his father, to whom he was apprenticed before entering upon an apprenticeship with the firm of Messrs. William Anderson & Co., engineers, London. He afterwards joined the Pacific Steam Navigation Company as engineer and subsequently served in that capacity in the Orient Line, sailing to and from Australia. Having been with that company some fifteen years he commenced practice on his own account as consulting marine engineer at 53, Derby Road, Canning Dock. He was the inventor of a tonnage rule and [illegible] patent for examining insulated chambers on board steamers; a patent steamer and many other engineering and labour saving appliances.

The business had grown so extensively during the last few years that it was found necessary to build larger premises. Mr. Anderson took a great interest in the designing of the new place, and the result was a magnificent building with comfortable offices, large showrooms and workshops, all equipped in accordance with modern methods. Unfortunately he did not live to see the comfort and convenience of the new premises very long, as he died a few months after they were occupied by the staff and workpeople.

The deceased gentleman was of a most unassuming disposition, and was well liked by all with whom he came in contact. He was an active Conservative and a member of the Booth Conservative Club. He was [illegible] of the Hoskett Park Sunday School Club.

The late Mr. Thomas Anderson

Mr. Anderson, who did a considerable amount of philanthropic work in a quiet way, leaves a widow, two daughters and a son to mourn his loss, the latter of whom is now carrying on the business in the position occupied by his father.

THE "DELHI" ENQUIRY.

JUDGMENT was delivered on February 23rd at the close of the Board of Trade Inquiry into the stranding and loss, off Cape Spartel, on the Moroccan coast, on December 13th of the P. & O. liner *Delhi*. The Court found:—The vessel was not navigated with proper and seamanlike care. The serious damage to and loss of the *Delhi* were caused by the default of the master. In view of the master's unblemished character during twenty-nine years' service with the P. & O. Company, the trying circumstances in which he was placed, and the able manner in which he conducted operations after the casualty, thus ensuring the rescue of the whole of the crew and passengers, the Court refrained from dealing with his Certificate. In reviewing the circumstances the Court decided that the vessel was not supplied with proper and sufficient charts and sailing directions, and although charts [illegible] up to date and sailing directions dated [illegible] were on the ship, [illegible] and obtainable for charts actually supplied and some [illegible] dated 1905, and the sailing directions were those issued in 1900. The primary cause of the stranding and loss of the vessel was the over-confidence of the master with regard to his dead reckoning position on December 12th, his neglect to take soundings [illegible] on December 12th, and his [illegible] that the vessel was on a safe course [illegible] danger. The immediate cause of the stranding of the vessel was the alteration of the course at [illegible] 13th. In view of the [illegible] 1 a.m. on December 13th, and for the failure [illegible] not Spartel [illegible] the Court [illegible] that the vessel was not navigated with proper and seamanlike care. The Court stated that no blame could be attributed to the fourth officer, and expressed admiration of the gallant conduct of the [illegible] who did so much to save the lives of the crew and passengers.

Industrial and Trade Notes.

THE CLYDE AND SCOTLAND.

(*From Our Own Correspondent.*)

FEBRUARY is a short month in itself and for this reason seems to accentuate the smallness of the Clyde output of new tonnage during its course. It could scarcely, however, be expected that anything like the same pace would be maintained as characterized the doings of January, when eighteen vessels of an aggregate tonnage of 40,000 tons were launched, this figure constituting the highest total ever recorded for the first month of the year. During January also great briskness prevailed in the placing of new work, and here again there has been a marked falling off during February. It would seem in fact that with the placing of the two Cunard liners with Scott's Co. of Greenock, the boom in orders for important tonnage reached its limit. For several months past shipbuilders' prices have been advancing steadily and have now, it would seem, reached the stage which might almost be described as prohibitive. Uncertain or deferred delivery has also been a factor in restricting the flow of orders. The vast amount of work on hand and the feeling of unrest in industrial circles—in no branch more pronounced than in shipbuilding—are the underlying causes of the advance in prices and the uncertainty as to delivery. Although there are no positive stoppages at the moment the recent minority vote of the members of the Boilermakers' Society to throw over the principle of having a working agreement with the Shipbuilding Employers' Federation is likely, if adhered to, to lead to incalculable consequences. Then there is the discharge note problem, which is a present trouble, and the men's demand for a forty-eight hours' working week, all of which, with the ever imminent question of wages advance, are sufficiently harassing.

Scott's Shipbuilding and Engineering Co., Ltd., Greenock, have booked still another vessel of large tonnage and elaborate equipment. This is a steamer of 450 ft. in length and about 11,000 tons, for the Holt (or Blue Funnel) Line, Liverpool, somewhat larger than the *Rhesus*, lately built by the firm for the same owners. The vessel, it is understood, will be of an entirely new class for the Holt Line as regards general arrangement, but will embody all the features of accommodation and of rapid working of cargo for which all the vessels of this Line are distinguished.

The Clyde Shipbuilding and Engineering Co., Port Glasgow, have contracted to build and engine for Messrs. R. F. Sanderson & Co., Manchester, a steamer of 3000 tons dead weight capacity, suitable for the Baltic trade. The vessel will be classed with the British Corporation Registry and will be constructed under the supervision of Messrs. Douglas and Adair, consulting engineers and naval architects, London and Marseilles.

Messrs. A. & J. Inglis, Pointhouse, are proceeding leisurely to lay the keels of the three turbine steamers, for which they received the order in December from the South Indian Railways Co. The last of the three is not required before March, 1913, and each will cost about £40,000. They are practically to be glorified ferry steamers, to connect the Indian with the Ceylon lines of railway, and are to be capable of maintaining an average speed over the twenty miles from pier to pier of at least 16 knots. They will be propelled by Parsons turbines, in the manufacture of which Messrs. Inglis have already proved themselves masters. The boilers, it is understood, are to be of the Yarrow water-tube type. The vessels are to be of 250 ft. in length and will have accommodation amidships for saloon passengers—both European and native—with a promenade deck on the roof of the saloon; and for 500 deck passengers, who will be under a permanent wood awning, and canvas side screens will also be provided. Each vessel will have three roomy gangways a side, and motor cars will find room on its upper deck forward. The vessels will be fitted with electric light throughout. There is every prospect of the main East and West steamship lines being immensely helped by these new transport facilities to Colombo.

Messrs. William Denny & Brothers, Dumbarton, are making due progress with the construction of the hull and machinery of the new turbine steamer *Queen Alexandra*, to take the place in Clyde passenger service of her predecessor of the same name, which is now the *Princess Patricia* of the Canadian Pacific Railway Co. The new vessel will be a duplicate of her predecessor so far as general design is concerned, the only difference of importance being that she will be fitted with more powerful reversing turbines—these, of course, being of the Parsons type. This will enable her to be more easily handled at piers and in the narrow parts of the channel. It is worthy of note that although the passenger steamer *King Edward* and the original *Queen Alexandra* were the first of all mercantile turbine steamers, their design is being repeated, practically without alteration, eleven years later.

Messrs. MacLaren Brothers, Ltd., Dumbarton, have applied for and obtained the sanction of the Clyde Trustees to run the speed trials of eighteen motor pinnaces of 20 ft. long and having a speed of 6 knots, which they are building for the Admiralty, over a course on the River Clyde between Dumbarton and Dunglass. It was agreed to accede to the request of Messrs. MacLaren during the pleasure of the trustees, on condition that the bye-laws are observed and that the trustees are freed of all responsibility.

Messrs. The Ailsa Shipbuilding Co., Troon, whose shipyard and engine works are at present full of work, are making extensions in several directions. At present a new joiners' shop is in course of erection and plans have just been passed for the erection of a foundry and copper shop for the engineering works. On the stocks are three steamers of 300 ft. in length overall, under construction for Brazilian owners to the order of Messrs. John M. Campbell & Son, Glasgow. They are sister ships, and similar to the *Itapura*, launched about the end of January, and now ready for trial. They are to be engaged in mail and passenger service and are fitted with good accommodation for a large number of first and second-class passengers. Appliances for the rapid handling of cargo are to be fitted, and hydraulic cranes will be used for the purpose. The vessels will be fitted with twin-screw triple-expansion engines of about 2000 I.H.P., constructed by the builders themselves, and designed to give the vessels a speed of 12 knots.

Educational Facilities in Marine Engineering.—There has recently been presented to Allan Glen's School, Glasgow, by Mr. P. MacLeod Baxter, of Messrs. McKie & Baxter, engineers, Govan—a former student of the school—a compound surface condensing marine engine, to be used for practical education purposes. The engine is not in the nature of a model, but an actual working engine, and though only of 15 horse-power, the general appearance, design and arrangement are substantially the same as in an engine of 500 horse-power. With a real working engine complete in every part, and capable of being taken to pieces for the purpose of making working drawings, the engineering students of Allan Glen's are indebted to "an old boy" for a gift the value of which would be difficult to estimate.

Montrose Shipbuilding Yard, which was closed about three years ago, has of late been inspected by prospective purchasers or tenants, and it is now stated that it will be re-opened shortly. Mr. John Fletcher, who was head of the firm from the time when it was re-started following upon its tenancy by Messrs. Duthie, of Aberdeen, is to manage the new undertaking. Arrangements are being made for the resumption of work, and it is understood that a number of orders have been booked. The Harbour Trustees have decided to reconstruct and extend one of the quays at the Harbour at an estimated cost of £4,800. Besides being of great service in connection with the fishing industry the reconstructed quay will be of considerable benefit to the general trade of the harbour.

Messrs. The Caledon Shipbuilding Co., Dundee, launched on February 6th, and are now busily outfitting a passenger steamer built to the order of Messrs. M. Langlands & Sons, Glasgow and Liverpool, and intended for this firm's yachting tours round the northern portion of Scotland. She is 303 ft. in length, 38 ft. beam, 17 ft. 3 in. moulded depth, and of about 1,567 tons gross. Accommodation is provided for about 200 first-class passengers.

Messrs. Cooper & Grieg, marine engineers, Dundee, are at present fitting into the steamer *Sant Tookaram*, recently launched from the Grangemouth yard of the Greenock and Grangemouth Dockyard Co., engines and boilers to give a high rate of speed. The new vessel is for service in East Indian waters.

TYNESIDE AND WEARSIDE.

(*From our Own Correspondent.*)

Tyneside.

TRADE continues very brisk in the shipbuilding and marine engineering trades up and down the river, most of the yards being booked up with orders to last them months. There is still unrest among the shipyard workers, even after the settlement of the discharge note system. The boilermakers are against a continuance of the National Shipyard agreement, and are also against an amended agreement. The vote taken amongst the members, being against it by a large majority, the existing agreement is finished on March 6th.

Messrs. MacColl & Pollock, Engineers, Sunderland, are very busy, and have in hand engines for vessels building in various places. They are engaged on a set of engines for a vessel for the Newfoundland sealing, also on two sets for two passenger steamers for Messrs. Elder, Dempster & Co., several sets for trawlers, one set of engines for a vessel building in Bilboa in Spain, one set for a vessel building at Blyth, three sets for vessels building at Alloa, besides a large amount of repair work on various ships on the Wear and other rivers.

Messrs. Geo. Clark & Co., Ltd., are very busy, having enough work to last them all this year and well into the next year.

Messrs. John Dickinson & Sons are also busy with sets of engines for various firms, and have work in hand to last them a considerable time.

Wearside.

The yards on the Wear are also very busy, work being plentiful both in the shipbuilding and engineering trades, and it is to be hoped there will be no coal strike and thus allow the work to proceed without delay.

Messrs. S. P. Austin & Son, Ltd.—This Company continues to be busily engaged with the construction of new vessels and repair work. Bad weather delayed the launching of a new collier steamer for a Yorkshire Company, but the vessel will have been launched before these notes appear; the engines will be supplied by Messrs. George Clark, Ltd., Sunderland. Another collier steamer, building to the order of a local Company, is being completed and will be ready for launching this month. Material is being received for other vessels to occupy each of the three building berths in this yard. The repairs and overhaul of a large locally owned steamer are now being completed, and she will shortly leave the Pontoon. Repairs of an important and extensive character are being carried out to the local collier steamer *Monkwearmouth*, and her machinery will be lifted out to facilitate the work. Another steamer is waiting a turn for the repairs of somewhat extensive bottom damage, and it is expected that she will remain in the firm's hands for about three more weeks. A small vessel is expected shortly for the renewal of her framing, and good docking business is looked for in the coming month.

THE TEES AND HARTLEPOOLS.

(*From our Own Correspondent.*)

Whitby.

Messrs. C. Marwood & Co., managers of the International Line S.S. Co., of Whitby, are reported as having sold the s.s. *Caledonia*, 2,684 gross tons, for about £9,500.

A new private concern has just been formed under the title of the Eston Steel and Galvanizing Co. for the manufacture of plates, etc.

Middlesbrough.

Messrs. Sir Raylton Dixon & Co., Cleveland Docykard, continue to be very busy. The cargo steamer for Australian owners will be fitted with machinery by Messrs. Richardsons Westgarth & Co., Ltd., the boilers supplied by their local works and the engines by their Hartlepool works.

Messrs. W. Harkess & Co., Ltd., are busy in all departments. They are reported as having secured the contract to build a collier of about 2,000 tons deadweight for a Southampton firm.

Messrs. Smith's Dry Dock, South Bank, are very busy. New work reported is a cargo steamer of about 2,[illegible] tons deadweight contracted for by Messrs. Vogt & Magnus, Liverpool, for Norwegian clients, also two steamers to the order of Messrs. Furness, Withy & Co., Ltd., for the London Welsh S.S. Co., Ltd., who have also placed a cargo steamer with the Goole Shipbuilding Co., Ltd., Goole.

Messrs. Richardsons, Westgarth & Co., Ltd., continue as busy as ever. They have a large amount of orders on hand for hard work, and are reported as having secured the order to supply the machinery for the cargo steamer to be built by Messrs. Smith's Dry Dock Co., Ltd., for Messrs. Furness, Withy & Co., Ltd.

Great activity is shown in the steel trade and several firms are altering their Bessemer basic plant to the open hearth system. Messrs. Bolkow, Vaughan & Co., Cargo Fleet Co. and another firm are said to be laying out about half a million sterling in improvements and additions.

Stockton and Thornaby.

Messrs. Craig, Taylor & Co. continue to be very busy. Amongst the new work contracted for are two vessels of about 10,000 tons deadweight and about 430 ft. long for Messrs. Evans, Thos. Radcliffe & Co., Cardiff, with machinery by Messrs. Blair & Co.

Messrs. R. Ropner & Son continue to be busy, several enquiries being in the market for early delivery. No new orders for work is reported during the month.

Messrs. Blair & Co. are busy in every department. They are to supply the machinery for a cargo steamer of about 265 ft. long, 2,000 gross tons, to be built by the Grangemouth Dockyard Co., for Messrs. Ybarra & Co., Cabo La Plata, Seville, the engines being 16½ in., 27½ in. and 32½ in. and 36 in. stroke; also the machinery for Messrs. Evans, Thos. Radcliffe & Co.'s steamer building by Messrs. Craig, Taylor and Co., previously mentioned.

Messrs. Richardson, Duck & Co. continue very busy, and are reported as having secured a contract to build a cargo steamer somewhat similar to the one recently sold.

West Hartlepool.

Messrs. W. Gray & Co. continue to be very busy; they are reported as having booked an order to build a cargo steamer for local owners and another for Messrs. Strick and Co. It is reported that they have recently sold a cargo steamer of about 5,000 tons deadweight, 335 ft. long, with machinery of about 1,500 i.h.p., to foreigners for about £57,000.

Messrs. Irvine's Shipbuilding & Dry Dock Co., Harbour Dockyard, are busy both on old and new work. They are reported to have a small steamer building to the order of Messrs. Furness, Withy & Co., for Belfast owners, and as having booked a somewhat larger steamer for early delivery.

The Central Marine Engine Works of Messrs. W. Gray and Co. still keep busy in all departments, and are to supply the engines and boilers for the two steamers to be laid down by them as previously mentioned. Their specialty departments have a large amount of work in hand.

The new gates at the entrance to the West Hartlepool Docks are expected to be opened on the 1st March, when the Middleton Road will be closed for traffic to enable the North Eastern Railway Company to put down a new and larger swing bridge at the Central Dock.

Hartlepool.

Messrs. Irvine's Shipbuilding & Dry Dock Co., Ltd., Middleton Yard, have booked some contracts for a cargo steamer of about 7,[illegible] tons [illegible] for Messrs. C. Tyson and Co., West Hartlepool, also two steamers similar to those for Messrs. Houlder Bros. [illegible] London owners.

Messrs. Richardsons, Westgarth & Co., Ltd., are very busy, and have on hand the largest amount of work booked since its amalgamation, and new work contracted for includes the engines and boilers [illegible] new contracts of Messrs. Irvine's Shipbuilding and Dry Dock Co., Harbour and Middleton yards, also a set of machinery for a cargo steamer to be built by Messrs. Sir James Laing & Co., Ltd., Sunderland. They are very busy in their specialty departments, having a great variety of work on hand.

THE HUMBER AND DISTRICT.

(*From our Own Correspondent.*)

New Docks. The North Eastern and Hull and Barnsley Railway Companies New Joint Docks, now building, are making steady progress, and it is hoped in twelve months' time to announce the opening date. It has been decided to proceed at once with the construction of the North Eastern arm and also two Graving docks. The water area of the Dock will be thereby increased to 53 acres.

Hull's Geographical Advantage.—Mr. C. F. McCann, Trade Commissioner for the South Australian Government, and Mr. E. W. Ralph Chairman of the Co-operative Export Company, have been visiting the Port, and were delighted with the system of cold storage on the Alexandra Dock and the facilities for discharging from the ships direct to the cold storage and chilled rooms. Hull may look forward for large shipments as the Port can distribute the produce cheaper and more quickly into the Midland districts. The visitors had seen nothing to equal the Hull and Barnsley Railway storages and systems.

Hull as a Wool Port.—Fourteen vessels have discharged wool direct from Australia during the month to the extent of 55,852 bales, and the s.s. *Hellenic* and s.s. *Australian* are now about due. The great saving to shippers can be easily seen Bradford being not far from Hull, hence a great saving in rates is obtained as against London.

S.S. "Humber."—The s.s. *Humber*, owned by the Lancashire and Yorkshire Railway Co., trading between Goole and Hamburg, has been in collision with the Dover schooner *Friendship* in the mouth of the river Humber during a fog. The schooner was sunk and one life lost. The *Humber* proceeded on her voyage and upon entering the River Elbe, during a fog she was run into and sunk by the German steamer *Answald*, bound for Africa. All the crew of the *Humber* were saved and taken to Hamburg. The s.s. *Humber* had a general cargo and was a vessel of 1023 tons. She was built in 1903.

R.M.S. "Bayardo," Wilson Liner.—The *Bayardo*, launched 27th July, 1911, from Messrs. Earle's shipbuilding yard, came to grief on January 21st in the Humber, after a successful run from Gothenburg, Sweden, with mails and passengers, under rhe command of a well-tried and careful navigator in the person of Captain Soulsby. Coming up the river in a fog, she got ashore opposite Alexandra Dock on a sand bank on a falling tide; the master did his utmost with the help of tugs and his own engines, but failed, the result being the vessel has broken in two and become a hopeless wreck, almost opposite her builders' yard. The London and local Salvage Companies have salved a great quantity of cargo, such as kegs of butter, iron pulp, and all movable machinery about the decks. The vessel was just finishing her thirteenth voyage. The loss is somewhere about £100,000. No lives were lost. Particulars of this steamer will be found in the August number of the "Marine Engineer."

Immingham Docks.—The construction of the new docks on the River Humber, Lincolnshire side, has given rise to important projects of railway development in the district, among which will be the transfer of the Barton and Immingham light railway to another Company. A Bill is now pending in Parliament, the object of which is to confer various powers upon the Great Central, the Great Northern and Hull and Barnsley Railway Companies to purchase land and carry out the necessary works of extending their undertakings in the district, notably in connection with the West Riding and Grimsby Railways, and to enable the Humber Commercial Railway and Dock Company to acquire the Barton and Immingham Light Railway.

Hull Central Dry Dock and Engineering Co., Ltd., have been very busy during February on several steamers which have been under Lloyds survey. The firm's own graving dock is well booked ahead.

Messrs. C. D. Holmes & Co., Ltd., have been keeping fairly busy during last month, having sent off four new trawlers on their trial trips; the erecting and moulding and boiler shops are working at full pressure. The branch shop, Alexandra Dock, has been fairly busy on repairs of several steamers and fitted several new furnaces in boilers. The outside staff are busy on mill work.

Messrs. Amos & Smith, engineers and boilermakers, are still running their night shift, and the machines are working at full pressure. They have a great number of orders to execute yet. All branches connected with their extensive works are exceedingly busy. The outside staff are busy on vessels in the docks, some undergoing extensive overhauling. The branch shop at Alexandra Dock is very busy with graving dock work and general overhauling.

Messrs. Woodall & Co., engineers and boilermakers, are fully employed in the works with orders for derrick Blo outfits, forgings for the London County Council, &c. A fair amount of work has been done on several steamers during the month, including s.s. *Ravisk*, s.s. *Dott*, s.s. *Hiram*, s.s. *Irma*, s.s. *Skjold*, and others. The prospects for next month seem good.

North-East Coast Engineering Works, Ltd., have had a fair month with general repairs on the following steamers: s.s. *Admiral Tronde*, s.s. *Sheffield*, s.s. *Haydn*, s.s. *Snowdonian*, s.s. *Domingo de Larrinaga*, s.s. *Asuncion de Larrinaga*, s.s. *Pebbles*, s.s. *Fox*, s.s. *Alumwell*, s.s. *Floriston*, s.s. *Queen Eleanor* and tug *Chester*; the s.s. *Domingo de Larrinaga* has had very extensive damage repairs, and new boats. The firm is well booked up with orders.

Messrs. Stewart & Craig, engineers and boilermakers.—This firm has had a fairly good month in repairing work on the following steamers, s.s. *Myrtledene*, s.s. *Vera*, s.s. *Muncaster*, general damage, partly new bulwarks, s.s. *Kaga*, new propeller fitted, and several other steamers. It has been found necessary to increase their staff to cope with their ever increasing business.

Messrs. Cochrane & Son, shipbuilders, Selby, are receiving a number of orders for trawlers and drifters for local and outside owners. Six were launched last month. They seem to have sufficient work now to carry them through this year.

Messrs. Coopers & Co., Ltd., engineers and boilermakers, and graving dock owners, are exceedingly busy in all their departments; they have also had the following vessels under repairs, the s.s. *Sampan*, hull damage and general engine and deck repairs, s.s. *Sartor*, s.s. *Odessa*, hull and deck repairs. The branch shop at Alexandra Dock has also been full up with work; their graving dock has been fully occupied and is well booked ahead for coasting craft. The moulding shop has received many orders for Cooper's patent propellers for home and export.

Loss of a Vessel.—The Wilson Line has given up all hope of their s.s. *Genoa*. She sailed from Blyth for Riga, in the Baltic, and has seemingly gone down with all hands. Life buoys have been found on the Berwick Coast. The chief engineer, Mr. R. Stark, had been with the Company about forty years, and most of his time was occupied in the New York trade. The second engineer, Mr. Rawson, had been in the Company's employ about twenty years, with a break of seven years ashore as superintendent engineer. Mr. Fawcett, third engineer, had been with the Company a few years.

SOUTH OF ENGLAND AND ISLE OF WIGHT.

(*From our Own Correspondent.*)

White Star and American Lines.—This month the time tables of these Companies assume a more definite form, the former Company's steamers taking the Wednesday sailings and the latter Company the Saturday sailing. The Atlantic transport steamers will revert to the London sailings. According to present arrangements the *Titanic* will leave Belfast on the 1st of next month for Southampton.

The Cunard Company.—Last month there were two sailings from Southampton for Canada, *viz.*, the *Ausonia* and the *Ascania*. The former vessel has had her annual overhaul, during which extensive alterations were made to the second-class accommodation, which has been remodelled and brought up to the Company's standard for this route. This month the *Ultonia* (10,400 tons) is to be transferred to the Canadian service and sails from Liverpool on the 14th inst. She will afterwards sail in conjunction with the *Ascania* and *Ausonia* from London and Southampton.

The s.s. "Horatio."—Last month Mr. Justice Bargrave Deane settled a claim by the owners of the tugs *Hector*, *Ajax* and *Neptune* and other parties for salvage remuneration for

services rendered in Southampton Water last November. A paragraph on the subject of the fire on board the *Hecate* appeared in our December issue. The tugs put out in response to urgent calls for assistance and got out their hoses and eventually the *Hecate* was beached on the mud off Netley and the fire extinguished, the water being afterwards pumped out and the vessel docked. The Judge awarded the *Hecate* £500, the *Lucy* £250 and the *Neptune* £200.

Messrs. J. Samuel White & Co., East Cowes, I. of W. All departments of the above Company continue to be very busy, and a number of craft of varying types have been delivered during last month.

Messrs Day, Summers & Co., Ltd., Northam Ironworks.—The tug boat *Dan Rebate*, which the firm have constructed to the order of Messrs. Liebig's Extract of Meat Company, completed successful trials last month, when she attained a speed of 8¼ knots on the measured mile. The vessel is fitted with compound engines having cylinders 9 in. and 18 in. dia. with an 18 in. stroke, the working pressure being 120 lbs. per square inch. The vessel will shortly proceed to South America under her own steam, and owing to the hot climate special arrangements have been made to work the engines from the main deck. H.M.S. *Spanker*.—The overhaul to this vessel is now nearing completion, and she was taken out of dry dock last month. Several yachts are at the yard preparing for cruises and repairs and alterations are in hand on the P.S.'s *Queen* and *Duchess of York*.

Messrs. John I. Thornycroft & Co., Ltd., Southampton.—The general work in hand has made good progress during the past month, and the repairs department has been well occupied upon troopships, yachts, and dockyard craft. All the British Admiralty work in hand has made good progress, and the repeat order for a 100-ton lighter for the Crown Agents for the Colonies will probably be shipped this month; also satisfactory trials are reported with the 50-ft. motor launch on order.

Retirement of Mr. Orlton Cooper.—After five years' service at Southampton as superintendent of the Board of Trade this gentleman will shortly retire, having reached the age limit. The staff here made this the occasion for a presentation, which took the form of a handsome cigarette box suitably inscribed. Mr. Cooper, in acknowledging the kindness of the staff, said that both officially and unofficially he had never found so many friends as at the Hampshire port. Mr. Cooper has actively identified himself with several local institutions, who will greatly miss him. He succeeded Mr. B. A. Forrow here, and has now completed forty-seven years' service, having entered the service of the Board of Trade in 1865 as a clerk.

THAMES.

(*From our Own Correspondent.*)

Shipbuilding.—Since our last issue much has been done as regards possible Admiralty orders for the port, but at the time of going to press there is nothing definite to report. The men, having agreed to accept a reduction in wages, the way was made easier. The Admiralty conditions are reported to be against treating with the Receiver of the Thames Ironworks at all, and this necessitates, therefore, the formation of a new Company. Such a likely combination is said to include supporters who are able to control armour plate supplies, which Mr. Arnold Hills has declared is what he has had to fight against on all previous occasions. Meanwhile, directly a new combination becomes an accomplished fact we may expect to hear of the orders for the two cruisers being placed here. The *Thunderer* has recently proceeded to Devonport to be docked before going upon her trials.

Port Rates.—The case, which has been before the public for some time past and brought by the Port of London Authority against the leading railways concerned in the trade with the docks, has terminated, and judgment been delivered. It was an application to vary the present mode of procedure altogether and to do away with the continuated dock dues the railway companies at present possessed on exported and imported goods, and the Court seemed to think this meant an endeavour to divert traffic from barge to quay and so augment the Authority's revenue. The "free water" clause the Authority apparently objects to. However, the judgment is against them, and in favour of present arrangements remaining, as being helpful to the trade of the port as a whole.

The Dock Improvements. The schemes for [illegible] the docks, which we have previously referred to, [illegible] some shape, and it is reported that the King, in [illegible] with the Queen, will perform the ceremony of cutting the first turf of the new South Albert Dock. Tenders will shortly be invited, and the cost of the undertaking will be over [illegible] million pounds and take five years to complete. The new dock will have an area of 65 acres, and a depth of water of 38 ft. and a length of quayage of [illegible] ft. The dock is to be 4,000 ft. long and 700 ft. wide at the eastern end and [illegible] ft. at the western entrance. The entrance lock is to be 800 ft. long and thus a ship 750 ft. long will be able to get admittance, the depth of water on the sill being 45 ft. There is also to be a dry dock 650 ft. long and ships twice the size of those using the present docks will thus be accommodated. By river there are other improvements decided upon, such as the East and the West India Docks. At the latter a dry dock will be constructed 700 ft. by 90 ft. and 28 ft. deep. In the former case vessels of [illegible] tons will, with the improvements, be able to use the dock, and in the latter case ships of [illegible] ft. long will be the limit against the present one of [illegible] ft. The scheme is therefore a large one. By such constructions complete there would be no need to send the [illegible] elsewhere to be docked and with the dredging of the channel from the Nore giving 30 ft. depth at low water, vessels of the very heaviest class will be able to reach the Albert Dock twice every day of the year.

Thames Bridges.—Very shortly Southwark Bridge will be closed to vehicular traffic for two or three years during its reconstruction, foot passengers being accommodated by a temporary bridge in the meantime. As to the new Lambeth Bridge proposed, this, with approaches, will be 935 ft. long and will consist of five spans, the centre one being [illegible] ft. long, with a clear height above high water of [illegible] ft.

The Marine Society. The annual meeting of the Court of Governors has been held, with the Earl of Romney in the chair. The report states that [illegible] boys were sent into the Royal Navy during the year and 176 into the merchant service, 102 remaining on board at the end of the year. In conjunction with the Shipping Federation an effort has been made to increase the number of British forecastle hands in British ships.

MERSEY AND MANCHESTER SHIP CANAL.

(*From our Own Correspondent.*)

WHILE no new tonnage has been placed locally during the last month there are enquiries both for merchant and special Admiralty work. Tenders are in hand for a hospital ship and destroyers, some of which it is hoped may be placed in the Mersey District.

Messrs. Cammell, Laird, & Co.—The fitting out basin has lately presented a busy aspect, when the ships and craft of this firm have been coming [illegible].

The 27 knot destroyer *Lynx* has just completed very satisfactory trials on the Clyde and is now, with her sister-ship *Lapwing*, being prepared for commission. The two [illegible] to depot ships are also being [illegible] after having been machinery opened up for inspection, [illegible] trials. These vessels, which have proved admirable sea-boats, present a very smart appearance with their cruiser sterns and remind one somewhat of a smart gunboat. With the depot ship *Maidstone* now building at Scotts, the submarine section of the Navy will be distinctly stronger in appliances. Every care and attention has been lavished upon them to secure the highest efficiency for their work. It is expected that the Australian Cruiser *Melbourne* will be launched early in March, while the "Dreadnought" battleship is also fast approaching the launching stage.

The L. & N. W. Railway steamer *Connaught* was launched on February 29th. The first of the two Newport boats is making good progress, the keel being [illegible] and the frame set up. Various improvements are continued [illegible] in the railway and other facilities in the [illegible] with the ever-increasing traffic due to the large amount of construction. The annual staff dinner [illegible] on the

2nd of March when Mr. G. I. Hitchens, Chairman of the Company, is expected to preside.

The large facilities for large repair work have been fully employed, whilst several contracts have also been carried out on the Liverpool side, all repair work now being directed from the offices of the firm in the Royal Liver Building, under the supervision of Mr. Roy Land. The Pacific Steam Navigation Company's steamer *Oropesa* and *Flamenco* have undergone repairs in the Langton Graving Dock. At the Birkenhead Yard the large oil steamer *Cleveon* has been in No. 6 Dock for bottom inspection and other repairs due to grounding. The Norwegian steamer *Taurus* has also been in dry dock. The Liverpool and North Wales paddle steamer *Snowdon* is in the wet dock for a new cylinder and bunkers, etc., while the tug *Black Cock* is in dry dock receiving a new shaft. The steamer *Zone* will shortly come from Lisbon for extensive repairs to her refrigerating machinery and insulation outfit. She was towed into Lisbon with her air-pump broken.

Messrs. H. & C. Grayson.—With a reputation second to none in the kingdom this firm have as usual been kept very busy with important contracts. The *Mauretania* is at time of writing ready to resume her sailings after nine weeks in dry dock, during which time some 500 tons of material have been worked into her structure. This result reflects great credit upon all concerned. The C.P.R. steamer *Lake Champlain* is also making rapid progress with her extensive repairs, while at Birkenhead 30 ft. is being added to a coasting steamer, being a unique feat. At the Garston works the *Baron Lovat* is undergoing repairs, besides other contracts.

Messrs. Clover, Clayton & Co.—This firm have been kept very busy with a large variety of work. The Barrow dredger *Gilbertson* has had extensive bottom damage repairs carried out. The Preston Hopper Barge No. 1 has also had bottom damage repairs while the *Black Rock* and *Colwith Force* and the large Liverpool steamer *Semantha*.

The Isle of Man Steam Packet Co.—The annual report of this Company has just been issued. The total receipts are £213,750, being the highest on record. The directors report the purchase of the Isle of Man Steam Trading Co. of Castletown, which includes the cargo steamer *Tyrconnel*. The wages bill for the year is £86,006, salaries £8744, advertising, etc., £6333. After placing £32,982 against depreciation, the balance of £19,401 4s., including that carried forward from 1910, is left. A dividend of 6½ per cent. was declared, leaving £6901 4s. as a balance to carry forward.

The Mersey Railway Co.—At the half-yearly meeting of this Company held in London, Mr. James Falconer, M.P., stated that for the first time they had been able to pay interest on certain classes of original debenture stocks. As compared with the last year of steam working, the passengers carried had increased 120 per cent., while revenue had advanced 83·75 per cent., working expenses increasing only 6·5 per cent. In view of the prospect of industrial expansion he hoped soon to see good prospect for the shareholders.

The Manchester Ship Canal.—The report of the half-year's working has yielded an increase of £4000; this as compared with an increase of £21,000 for the preceding six months, has been due to strikes and other causes. The grain traffic has grown to some half million tons a year. The directors are building another elevator with a grain-holding capacity of 40,000 tons, and still further capital expenditure will be necessary to offset the recent loss of the banana trade. With the cessation of exceptional causes of loss, the eventual success of the enterprise is assured.

The Mersey Docks and Harbour Board.—The death occurred recently of Mr. Sam Wm. Shakespear, chief traffic manager of the Board. Entering the service in 1861 he was transferred to the traffic department in 1892, in which department he succeeded Mr. Proctor as chief in 1905.

At a meeting of the members on February 1st, Mr. D. E. M'Cracken was promoted from assistant to be chief traffic manager at a salary of £700 per annum. Mr. J. W. Hughes at this meeting presented to the Board a portrait in oils of Mr. A. G. Lyster, who, it was remarked, has been engineer-in-chief for the past fifteen years, during which time he has spent seven million pounds and spent it well. An open launch 35 ft. long and 9 ft. broad will be delivered from the makers at Bowness, Windermere, early in March, for the purpose of a ferry on the East Float between Vittoria Wharf and Seacombe. It will be fitted with 16 B.H.P. paraffin engines. Reference to the new works in hand is made elsewhere. With the advent of the *Selandia*, with her two Diesel motors of 3,000 horse-power, it is of interest to note that the Mersey Docks and Harbour Board are keenly alive to the possibilities of the oil engine. The Board has recently placed an order with the Worthington Pump Co., London, for five Diesel engines of 1,000 B.H.P. each. These engines are to be direct coupled to 54 in. Worthington centrifugal pumps, running at 180 revolutions per minute, and having an aggregate capacity of 47,000 cubic feet per minute. The engines will be built by Messrs. Carels Bros., of Ghent, and will consist of four cylinders each of their latest two stroke type, fitted with outside crosshead, and very similar to the Carels-Diesel marine engines. The whole of the work is to the specification of Mr. Lyster.

The Canadian Pacific Railway.—The vessels now completing will give this Company a fleet of seventy five vessels, with a continuous length of four miles. At the end of the year there will be twenty-five vessels engaged in the Pacific Coast trade, including twelve "Princess class" oil-burning steamers. Two monster "Empress" boats are now building in this country for the Pacific. The steamship department now employ 12,000 hands, while 5,000 tons of coal are burnt per day.

NORTH-WEST OF ENGLAND.

(From our Own Correspondent.)

Barrow.—The congestion of work in hand in the instance of Messrs. Vickers, Ltd., seems to be more marked month after month, and as a consequence there is a general increase in the number of men employed. It is reported that no less than 15,000 men are now in the employ of the firm at their Barrow works, and that the weekly wage bill is now not much below £30,000. More men are wanted in the several departments, and these are being engaged as they apply for work. The difficulty referred to in last month's report about the boilermakers refusing under the instructions of their society to work overtime on the Japanese battle-cruiser *Kongo* has necessitated an alteration of plans. This vessel it was hoped to launch in the first week of April, with a view to her taking her place at the fitting-up wharf at the Buccleuch Dock, to be then vacated by the British battle-cruiser *Princess Royal*, but it will now be June before the *Kongo* can be launched, and it is perhaps as well this is so because certain alterations have to be made in the *Princess Royal* which will entail a cost on the Admiralty of £25,000, and which will occupy two months time. In June the *Princess Royal* will go on her official trials, the *Kongo* will take her place in the Buccleuch Dock and a new ship will be laid down on her ways. It is understood that it was intended to lay down the new British battleship on the ways now occupied by the *Kongo*, but it is probable she will be put down on other ways in the yard not at present occupied. The necessity for additional permanent ways in the yard is, however, so urgent that means are already being employed to clear away other parts of the shipyard to make room for two additional slipways capable of carrying the weight of the heaviest ships.

The "Princess Royal."—This fine battleship cruiser for the British Admiralty is rapidly approaching completion, and there is reason to believe she would have been ready for her trials in the beginning of April had it not been for the alterations determined on in her foremost funnel, which has to be removed away from the navigating bridge, as it was found in the trials of her sister, the *Lion*, that the heat given out by the funnel not only made it inconvenient for the officers working the vessel owing to the fumes and the intense heat originated, but it interfered with the compasses, and made it necessary, after the *Lion* had gone through her trials, to let the funnel cool down before the vessel could be taken into port.

H.M.S. "Phœnix."—This British torpedo boat destroyer, which is to be driven by oil engines, is now practically ready for her trials. She is a new departure in torpedo boat destroyers and considerable interest is taken in the experiment.

The Japanese Battle-Cruiser "Kongo."—As many men in various trades as it is possible to get on this vessel are employed, as it is necessary to get her launched as speedily as possible in view of another vessel taking her place. The work of the black squad is the most urgent, as it is necessary

the skin of the vessel shall be fully completed before a launch is possible. A vast army of men are at work inside and outside of the ship. Now that the launch will not take place before June it is possible to get the vessel ready in every sense to take the water. She is the largest vessel yet built at the Barrow yard.

The Montreal Floating Dock. Work on this dock is proceeding very satisfactorily, as it is necessary she shall be completed in the early spring to be delivered in the St. Lawrence after the break up of the ice. She is a monster construction and quite the most up-to-date floating dock yet designed. The room she is occupying in Messrs. Vickers' yard occupies two big launch ways. She will be launched in sections, and riveted together when afloat in Walney Channel. Then when completed she will be towed out to Montreal.

The Turkish Battleship.—The Turkish battleship *Reshad-i-Humus* is beginning to lift her side frames and her stern port is already in position. She will probably be launched later on in the year or in the beginning of 1913. She will be an up-to-date super Dreadnought, and will embrace all the improvements in British naval construction known at the moment.

Submarines. During February the first of the E class of submarines was launched from Messrs. Vickers' yard. She is much larger than any submarine yet built, and has been designed to go out to sea with a considerable radius of action. She will carry two quick firing guns which can be raised, fired and lowered with the greatest facility, and which can fire a very destructive shell. Five other vessels of the E class are on order and lately the order has been given to the Barrow firm to build three super E's, which mark a still further advance in sub-aqueous construction.

Shipbuilding Extensions.—Considerable extensions are in progress in the Vickers' yard with the view of making it more complete as an establishment. New engineering offices are in progress of construction, and the site occupied by the present offices is being utilized for an extension of the gun shop, which is crowded with work.

Steel Trade.—The demand for shipbuilding classes of steel is well maintained, but although better prices are ruling for plates and other material local works are not yet in a position to restart their mills.

Shipping.—Shipping shows a slight improvement, but there is no briskness to note in any department.

BELFAST.

(From our Own Correspondent.)

Messrs. Harland & Wolff will launch shortly from the south end of their yard the third of the 11,500 tons twin-screw steamers which they have on order for the Royal Mail Steam Packet Company, the sister ships *Desna* and *Demerara* being already at the fitting out wharves, as is also the triple-screw mail and passenger steamer *Orbita* for the same owners. Another vessel of similar type to the last named has been, it is understood, ordered from Messrs. Harland and Wolff by the Royal Mail Company. The contract for a Union Castle liner has also been placed with the Queen's Island firm. The White Star liner *Titanic* is at time of writing in graving dock. Steam has been raised on several of the boilers, and the vessel is beginning to acquire a seagoing appearance. She is expected to take up service at the beginning of April. The overhaul of the White Star tender *Magnetic* has almost been completed and she will shortly take her departure from the port. No further authentic news is to hand regarding Messrs. Harland & Wolff's rumoured intention of establishing repairing works in Liverpool, but there is every reason to believe that the Mersey will shortly have this addition to its already extensive repairing branch of the shipbuilding industry.

Messrs. Workman, Clark & Co. have the twin-screw steamer *Eredia* fitting out, also the twin-screw Lyser liner *Makuria*. Full particulars of the former vessel, which was built to the order of Messrs. Lamport & Holt, Ltd., appeared in the launch columns of the February issue of the "Marine Engineer." A sister-ship, the *Desdea*, will be ready for leaving the ways shortly. The *Makuria* is 480 feet long, with a gross tonnage of 10,500, and will be propelled by two sets of triple-expansion engines supplied with steam from four single-ended boilers working under forced draught. In addition to a big volume of other work in hand, Messrs. Workman, Clark & Co. have another batch of [illegible] on order. One or two of these will be [illegible] and of considerably greater dimensions than any yet built by them. Repair work has been slack during the past [illegible] months or so, but Messrs. Workman, Clark & Co. have two big jobs on hand at present. The White Star liner *Romanic* which was recently bought by the Allan line and renamed *Scandinavian*, is being overhauled and extensive internal alterations carried out to suit the new owners' Canadian trade. In graving dock they have the Ellerman liner *City of Lahore* which went ashore a short time ago on the County Down coast. The prospect of saving the vessel appeared very doubtful for awhile, but she was eventually got off and brought to Belfast. She had gone hard and fast on a rocky bottom, and the damage received is very extensive, the vessel's bottom being badly holed and torn up over a considerable area.

Larne Harbour was recently purchased by a syndicate with plenty of money at its back, and important developments are to be looked for. There is already a considerable cross-channel trade with the port. In addition to the Stranraer mail service daily in the winter months and twice daily in the summer time, there is a bi-weekly service to Glasgow, and three times a week to Ayr. Larne is 116 miles from Glasgow, 156 from Liverpool, and 30¼ from Stranraer.

NEW NAVAL AIRSHIP.

IT is now definitely known that the order for a second naval airship has been placed by the Admiralty with Vickers' Limited. There is no official intimation of this fact available, but the fact that the chief inspector under whose charge and control the vessel has to be built is already in Barrow engaged in the preliminary details of the work he has on hand is sufficient indication of the fact. No details are available as to her designs or specification, and probably these will not be forthcoming until later on. When the First Lord submits his estimate he will doubtless make some statement as to the policy of the Admiralty in regard to dirigibles, but he will certainly not disclose any of the features of the new vessel to be built. It is interesting to know that structurally the new airship will be built of duralumin, the patent metal of Vickers which combines the strength of steel with the lightness of aluminium. No. 1 airship was built of this metal, and the latest Zeppelin dirigible is also being built in Germany of duralumin. The wreck of the first airship was not due in any sense to the use of this metal. The first airship will be scrapped, and Airship No. 2 will be built in the same shed under careful secrecy which will be assured by the presence of naval men. Last year Commander Schwan, of *H.M.S. Hermione*, carried out some useful and successful experiments with a new hydro aeroplane in Cavendish Dock, Barrow. He will resume his trials in April of this year, and he expects to so complete his machine as to make her eminently useful as a secondary help to dirigibles.

IMPERIAL MERCHANT SERVICE GUILD. A marriage has recently taken place at Bedford between Mr. A. E. A. Mackintosh, [illegible] secretary to the Imperial Merchant Service Guild, and Miss Gladys Crawford, daughter of L. [illegible] J. P. [illegible]. Mr. Mackintosh [illegible] apprentice-ship in the [illegible] sailing ship *Crompton* [illegible] and afterwards [illegible] the P. & O. fleet [illegible] until he lost [illegible] his master's certificate. He served under the command of Sir Ernest Shackleton in the British Antarctic Expedition.

LAUNCHES AND TRIAL TRIPS.

LAUNCHES—English.

Electra.—On December 18th, Messrs. Wm. Pickersgill and Sons, Ltd., launched from their yard at Southwick a finely modelled steel screw steamer. Her dimensions are :—Length, 300 ft., breadth 50 ft., and depth 25 ft. 10 inch. She has been built under special survey to take Lloyd's highest class as a single deck steamer with long bridge covering two main hatches. The vessel is built on the "Isherwood" system, and is fitted with cellular double bottom throughout for water ballast, in addition to which the after peak and fore peak are fitted as tanks. The vessel is provided with five large cargo hatches, each of which is fitted with double derricks capable of raising heavy weights, large derrick posts being fitted where necessary for the purpose. The ventilation of all cargo holds has been specially attended to, four large ventilators being fitted to each hold. The vessel will be rigged as a fore and aft schooner with steel lower masts and wood telescopic topmasts. Eight steam winches will be supplied by Messrs. Clarke, Chapman & Co., while a special quick-warping windlass will be fitted by Messrs. Emerson, Walker and Thompson Bros. The steam-steering gear is by Messrs. Donkin & Co., and is fitted in house amidships abaft the engine room, and controlled by means of rods and bevelled wheels from the flying bridge. The donkey boiler for supplying steam to deck range is by Messrs. Maccoll & Pollock. A large steel deckhouse is fitted on the bridge deck for the accommodation of the officers, with a large messroom tastefully fitted out in oak, while the Captain is berthed in a steel house above. The engineers are accommodated in large steel houses on the bridge deck. The forecastle will be fitted up for crew and petty officers. The machinery and boilers are being supplied and fitted by Messrs. George Clark, Ltd., the engines having cylinders 24 in. by 40 in. by 66 in. by 45 in. stroke, and the two large boilers are of steel with a working pressure of 180 lbs.

Clan Davidson.—On December 19th this vessel was launched by Messrs. Wm. Doxford & Sons, Ltd., Sunderland, for The Clan Line Steamers, Ltd., Glasgow. She is a specially constructed 'tween deck steamer with complete shelter deck above, and is specially insulated for the carriage of meat, fruit, etc., by Messrs. J. and E. Hall, Ltd., Dartford. She is a sister ship of the *Clan Macrae*, now finishing for the same Company, and which is also insulated in a similar manner. Her length is 450 ft. and she carries 8,500 tons on a very fine model, and is fitted with tri-compound engines by the builders, which drive the vessel at a speed of 13 knots. The classification is with the British Corporation Registry, Glasgow.

Hochelaga.—On December 20th, Messrs. Sir Raylton Dixon & Co., Ltd., launched from their Cleveland Dockyard, Middlesbrough, a fine steel screw steamer which they are building to the order of Messrs. Furness, Withy & Co., Ltd., West Hartlepool, London, etc. The vessel is of the latest improved type of patent "Cantilever" construction, with top-side water-ballast tanks, and is being constructed to receive the highest-class with British Corporation, single-deck type, with poop, bridge and forecastle. Her principal dimensions are 388 ft. 3 in. by 52 ft. by 29 ft. 9 in. moulded, and she will have a deadweight carrying capacity of about 7,600 tons on a light draught of water. She will have eleven hatchways, four holds absolutely free from all obstructions, such as beams, pillars, or web frames, and perfectly self-trimming, owing to the sloping sides of the top-side tanks at each side of the ship, and of the total amount of about 2,400 tons of water-ballast which the vessel can carry, about half this quantity will be in the top-side tanks. The vessel will have twelve derrick posts and twenty derricks, four boats, hand and steam-steering gear, and will be equipped with ten steam winches, steam windlass, etc., and all the latest and most modern appliances for the rapid handling of cargo. Triple-expansion engines having cylinders 26 in., 44 in. and 73 in. by 48 in. stroke, supplied with steam by three large single-ended boilers, working at 180 lbs. pressure, will be fitted by Messrs. Richardsons, Westgarth & Co., Ltd., Middlesbrough. The hull and machinery are being constructed under the supervision of Messrs. W. Copeman and C. H. Clayden, the owners' superintendents. Messrs. Wailes, Dove & Co.'s "Bitumastic" enamels have been applied to the top-side tanks, engine and boiler room tanks, also tank tops, etc.

Cotswold Range.—On December 21st, the Northumberland Shipbuilding Co., Ltd., launched from their yard at Howdon-on-Tyne, the finely moulded steamer *Cotswold Range*, which has been built to the order of Messrs. Furness, Withy & Co., Ltd., West Hartlepool. The vessel is 390 ft. long by 49 ft. beam by 29 ft. deep, and has been built under special survey to the highest class at Lloyd's. She is fitted with long bridge, long poop, topgallant forecastle, the accommodation which is very ample being placed in steel houses on the bridge deck. The 'tween decks are lofty and so arranged that cattle, troops or emigrants may be carried if necessary. Very special attention has been paid to the loading and discharging gear and a complete outfit for the rapid handling of cargoes arranged for consisting of nine steam winches by Messrs. Clarke, Chapman & Co., Ltd., Gateshead-on-Tyne, a large number of cargo derricks and steam windlass by Messrs. Emerson, Walker & Thompson Bros., Dunston-on-Tyne. She is fitted with the usual water ballast arrangements for light passages. The machinery will be supplied by Messrs. The North-Eastern Marine Engineering Co., Ltd., Wallsend, consisting of engines with cylinders 25 in., 41 in., 69 in by 48 in. stroke, three large steel boilers with 180 lbs. pressure. This vessel will carry about 7,500 tons on a light draught and steam about 10 knots loaded at sea.

Thorpwood.—On January 19th, Messrs. William Gray and Company, Ltd., launched the handsome steel screw steamer, *Thorpwood*, which they have built for Messrs. Constantine & Pickering Steamship Company, Middlesbrough. She will take the highest class in Lloyd's Register, and is of the following dimensions, *viz.* : Length overall, 346 ft. 6 in.; breadth, 48 ft.; and depth 24 ft. 10 in.; with long bridge, poop and topgallant forecastle. The saloon, staterooms, captain's, officer's and engineers' rooms, etc., will be fitted up in houses on the bridge deck, and the crew's berths in the forecastle. The hull is built with deep frames, cellular double bottom and large aft peak ballast tank, six steam winches, steam steering gear amidships, hand screw gear aft, patent direct steam windlass, large patent vertical donkey boiler, shifting boards throughout, stockless anchors, boats on deck overhead, telescopic masts with fore and aft rig, and all requirements for a first-class cargo steamer. Triple expansion engines are being supplied by The Central Marine Engine Works of the builders, having cylinders 24 in., 38 in., and 64 in. diameter, with a piston stroke of 42 in., and two large steel boilers for a working pressure of 180 lbs. per square inch.

City of Poona.—Messrs. Swan, Hunter & Wigham Richardson have launched a steamer of about 8,000 tons gross for the City Line. The vessel, which is named *City of Poona*, is intended for service between Glasgow and India, via Liverpool.

Ranvik.—At Walker-on-Tyne there has been launched the large cargo steamer *Ranvik*, which has been built to the order of Mr. P. A. Cron, of Sandefjord. The vessel is designed to carry a deadweight cargo of 11,000 tons on a moderate draught of water. She has exceptionally large hatches and an extensive outfit of winches, derricks and cargo gear, so that general cargoes of every description may be expeditiously handled. The vessel, which is of the shelter-deck type, has been built in accordance with the Norske Veritas Classification Society's requirements. The propelling machinery, to be supplied by the North-Eastern Marine Engineering Company, Wallsend, will consist of a set of triple-expansion engines, with cylinders 27 in., 45 in. and 75 in. by 48 in. stroke, taking steam from three boilers, working under forced draught.

Chevington.—On December 21st, there was launched from the shipbuilding yard of Messrs. John Readhead & Sons, Ltd., West Docks, South Shields, a new steel screw steamer, built to the order of the Ilderton S.S. Co., Ltd., London (Messrs. Steel, Young & Co., managing owners). The dimensions of the vessel are :—379 ft. by 53 ft. 9 in. by 25 ft. 2½ in. and carries a large deadweight and measurement cargo on a light draught of water, and with a small tonnage measurement. She is of the single deck type with large holds clear of obstructions, and also has a long bridge erection as well as poop and topgallant forecastle, double bottom throughout, and large after peak tank for water ballast. Shifting boards are

fitted throughout the holds, and erections for grain cargoes and a full and complete complement of derricks worked from nine powerful steam winches connected with a large donkey boiler of marine type for loading and discharging cargoes. The cabins for captain and officers, etc., are contained in steel deck houses amidships and the crew are berthed in the forecastle. The engines and boilers have also been constructed by Messrs. John Redhead & Sons, Ltd., the former having cylinders 26 in., 42 in. and 69 in. diameter, with 48 in. stroke, supplied with steam at 180 lb. pressure from two large boilers. The trial trip was run on January 14th and was completely satisfactory. The vessel then proceeded to Antwerp to load part cargo for the West Indies.

Barge.—On December 21st, there was launched from the yard of Messrs. Cochrane & Sons, Selby, a steel screw trawler, the principal dimensions being [illegible] ft. by [illegible] ft. 6 in. by 13 ft. 3 in. moulded. The vessel has been built to the order of Messrs. Petur. J. Thorsteinsson & Co., Reykjavik, and will be replete with all the latest improvements for the fishing trade. She will be fitted with powerful triple expansion engines by Messrs. Amos & Smith, Ltd., Hull.

Ubbergen. On December 23rd, Messrs. Irvine's Shipbuilding and Dry Docks Co., Ltd., launched from their harbour dockyard the steel screw steamer *Ubbergen*, built to the order of J. J. A. Van Meel, Esq., Rotterdam. The dimensions of the vessel are 250 ft. 7 in. by 40 ft. 2 in. by [illegible] ft. [illegible] ½ in. She has a single deck with poop, bridge and topgallant forecastle and has been built to the British Corporation Registry's highest class. A double bottom is fitted throughout on the cellular principle, the after peak is arranged as a trimming tank and the vessel is constructed with bulb angle frames and longitudinal stringers, giving clear holds for the stowage of bulky cargoes. Four watertight bulkheads are fitted, dividing the steamer into five watertight compartments; there are four large cargo hatches with a steam winch to each; the bulwarks have been specially strengthened for the carriage of deck cargoes, and the vessel is replete with all the latest improvements for loading and discharging expeditiously. A powerful quick-warping steam windlass is fitted forward for working the cables, and steam steering gear is fitted amidships with hand screw gear aft, and a large multitubular donkey boiler is also fitted. Accommodation for the captain, officers and engineers is arranged in deckhouses amidships, the crew and firemen being berthed in the forecastle. The cabins are heated with steam and the sanitary, ventilating and lighting arrangements are effected on the most improved lines. Triple expansion engines will be supplied and fitted by Messrs. Richardsons, Westgarth & Co., Ltd., Hartlepool, having cylinders 20½ in., 33 in. and 54 in. by 29 in. stroke, with two large single-ended boilers working at a pressure of 180 lbs. per square inch. A Cochran (Annan) donkey boiler with patent seamless furnace has been supplied and fitted. On the trial trip, which was run in February, everything worked in a satisfactory manner.

Lurline. On December 21st, Messrs. William Dobson and Co. launched from their shipbuilding yard at Walker a steel screw steamer which they have built for the Tyneside Line, Ltd., of which Messrs. John Ridley, Son & Tully, of Newcastle, are the managers. The vessel is built to the highest class at Lloyd's and has a length of 240 ft., breadth 35 ft. [illegible] and moulded 17 ft. 3 in. The steamer has been specially built for the coal trade with large bolt trimming hatches and very complete discharging arrangements. Electric light is fitted throughout. The steam machinery has been built by the North Eastern Marine Engineering Co., Ltd., at Wallsend, and is of the usual triple expansion type having cylinders [illegible] in. [illegible] in. diameter by 30 in. stroke. There are two large boilers which are expected to give the vessel a fair speed at sea.

Northern. On December 21st, a steel steamer of about 4,750 tons gross, named *Northern*, was launched at Sunderland. The owners are Messrs. Harris and Dixon, Ltd., and the Port of Registry, London.

Maskinonge. On December 22nd, Messrs. Short Brothers, Ltd., launched from their engineering works, Sunderland, the s.s. *Maskinonge*, built to the order of Messrs. H. J. & W. Russell, of Liverpool. This steamer has been specially designed for carrying coal for the Dominion Coal and Iron Co., of Sydney, C.B., with arrangements so that the cargo and bunkers will be entirely self-trimming. She is fitted on the Liverpool system to take Lloyd's highest class, and her leading dimensions are:—Length [illegible] ft. [illegible] in. and depth moulded [illegible] ft. [illegible] in. Water ballast is carried throughout the double bottom, in tops and after peak tanks and in wing tanks the full length of hold, amounting in all to about 2,500 tons. Ten large cargo hatches are fitted with steel hinged covers. The discharging arrangements are very complete, six derricks being fitted to each mast and eight samson posts with twelve derricks, worked by eleven steam winches. Accommodation for the officers with seven neatly panelled in oak is fitted in bridge with captain's room and office above, the chart and sleeping house being placed on to the captain's house with flying bridge on tops of captain's house and chart-room. The engineers are berthed in houses alongside of casing and the crew in topgallant forecastle. A sanitary service is installed throughout the officers, and engineers' accommodation. Steam windlass, steam steering gear in engine-room controlled from wheelhouse and connected to quadrant by rods and chains, and steam gear hoist will be supplied. The propelling machinery will be fitted by the North Eastern Marine Engineering Co., Ltd., of Sunderland and consists of engines with cylinders 26 in., 44 in. and 73 in. diameter and a stroke of 48 in., driven by three large multitubular boilers working at 180 lbs. pressure and fitted with Howden's system of forced draught. To enable the large quantity of water ballast to be expeditiously handled two large ballast pumps are fitted capable of discharging 300 tons per hour.

South Point. On December 22nd, Messrs. Irvine's Shipbuilding and Dry Docks Co., Ltd., launched from their Middleton Shipyard the handsomely modelled steel screw steamer *South Point*, built to the order of Messrs. Furness, Withy & Co., Ltd., for The Norfolk & North American Steam Shipping Co., Ltd. The vessel is of very fine lines and the dimensions are 300 ft. by 50 ft. by 27 ft. depth moulded, carrying over 7,000 tons on a light draught. She is built to British Corporation classification, having three complete steel decks, with cellular double bottom and fore and after peak tanks for water ballast. The vessel is constructed with deep sectional frames and is divided into seven watertight compartments by means of six watertight bulkheads. Four large hatches are provided and a cross bunker hatch amidships with all the latest facilities for the rapid loading and discharging of cargo, including nine powerful steam winches exhausting to a contraflo winch condenser in the engine room, and ten derricks, a powerful quick warping steam windlass is fitted forward with steam steering gear amidships and hand gear aft. Electric light is fitted throughout including large clusters at each cargo hatch. The vessel is fitted with special fire extinguishing appliances to each hold, 'tween deck and bunker and watertight bulkheads are fitted in the upper 'tween decks to minimise the risk of fire spreading from one end of the ship to the other. The captain, officers and engineers are berthed in large houses on the shelter deck amidships and the sailors and firemen under the fore part of the shelter deck. Triple expansion engines will be supplied and fitted by Messrs. Richardsons, Westgarth and Co., Ltd., Hartlepool, having cylinders 26 in., 42 in. and 70 in. by 48 in., with three large single-ended boilers 180 lbs. pressure, including contraflo main condenser, contraflo surface feed heater and cascade filter, bronze working propeller, spare tail shaft, and a very complete outfit.

Hooton. On December 27th, Sir Raylton Dixon and Company, Ltd., launched from their Cleveland Dockyard, Middlesbrough, the fine steel screw collier *Hooton* which they are constructing to the order of Messrs. The Derby & Cadeby Main Colliries, Ltd., of London and Doncaster. The vessel is being built to class 100 A1 at Lloyd's, and to comply with Admiralty requirements, and is of the raised quarter deck type with short bridge and forecastle. Her principal dimensions are 275 ft. 3in. x 38 ft. 9 in. x 19 ft. 8 in. moulded, and she will carry about 2,500 tons on a light draft of water. A [illegible] for captain, officers and engineers will be provided amidships at sides of vessel with saloon at [illegible] of bridge and chart room. Mess room, and flying bridge above. The crew and firemen will be berthed [illegible]. The vessel will have two large boilers, [illegible] bulkheads, six decks, and will be equipped with [illegible]

winches, steam windlass, hand and steam steering gear, and all the latest and most modern appliances for the rapid handling of cargo. She will be fitted with triple expansion engines by Messrs. George Clark, Ltd., Sunderland, having cylinders 21, 34 and 56, by 36 stroke, supplied with steam by two large single-ended boilers working at 180 lbs. pressure.

Quebra.—On January 4th, Messrs. William Gray and Company, Ltd., launched the handsome steel screw steamer *Quebra*, for The Mercantile Steamship Co., Ltd., London. She will take the highest class in Lloyd's register, and is of the following dimensions, *viz.*:—Length overall 38[illegible] ft., breadth 53 ft. 6 in., and depth 2[illegible] ft. 9 in., with two decks laid and extra long bridge, poop and topgallant forecastle. The saloon, staterooms, captain's, officers' and engineers' rooms will be fitted up in houses on the bridge deck, the petty officers' rooms in the fore end of bridge and the crew's berths in the forecastle. The hull is built with deep bulb-angle frames, large clear holds, cellular double bottom and large fore and after peak ballast tanks, nine steam winches, steam steering gear amidships, hand screw gear aft, patent direct steam windlass, steel shifting boards, boats on deck overhead, stockless anchors, telescopic masts with fore and aft rig, and equipped as a first-class cargo steamer. Triple expansion engines are being supplied by The Central Marine Engine Works of the builders, having cylinders 26 in., 42 in. and 70 in. diameter, with a piston stroke of 48 in., and three large steel boilers to work at a pressure of 180 lbs. per square inch. The trial trip was run on February 17th, everything working satisfactorily. The vessel averaged 11½ knots.

Davara.—On January 6th, there was launched from the yard of Messrs. Cochrane & Sons, Selby, a steel screw trawler, the principal dimensions being: 130 ft. by 23 ft. 6 in by 13 ft. 3 in. moulded. The vessel has been built to the order of Messrs. The Mount Steam Fishing Company, Ltd., Fleetwood, and will be replete with all the latest improvements for the fishing trade. She will be fitted with powerful triple expansion engines by Messrs. C. D. Holmes & Co., Ltd., of Hull.

Stiklestad.—On January 6th, the new steamer *Stiklestad* was launched by Messrs. Wm. Doxford & Sons, Limited, Pallion, Sunderland. She has been built to the order of Messrs. A. F. Klaveness & Co., Christiania. She is a vessel of the single deck type, with a complete shelter deck, having the wings of the shelter space devoted to water ballast, these being built on the special system of construction introduced by the builders last year, and together with the double bottom give the vessel a total ballast capacity of 3,300 tons. Her dimensions are: 460 ft. by 58 ft. by 36 ft. Her deadweight is 11,000 tons on 24½ ft. draft, being designed for special trades. She if fitted with tri-compound engines and high pressure boilers by Messrs. Doxford, these driving the vessel at 10½ knots loaded. She has been built under the superintendence of the district representative of Det Norske Veritas, and received their highest classification, and also under the superintendence of Messrs. C. A. Bushell, Nicol and Co., Newcastle, together with the owners' resident representatives.

Astree.—On January 25th, there was launched from the yard of the Sunderland Shipbuilding Co., Ltd., a steel screw steamer, of the following dimensions:—Length between perpendiculars 223 ft., breadth, extreme 33 ft., and depth 16 ft.; having raised quarter deck, bridge and top-gallant forecastle, built to Bureau Veritas highest class, under special survey. The vessel will carry 1500 tons deadweight, on a light draft, and is fitted with water ballast in cellular bottom and peak tanks. Accommodation is placed amidships for captain, officers and engineers, and the sailors and firemen are in the forecastle as usual. The saloon is also situated amidships, and is fitted up in polished hardwoods. The four steam winches, steam steering gear and direct steam windlass are driven by a suitable donkey boiler. The engines are by The North Eastern Marine Engineering Co., Ltd., Sunderland, and have cylinders 17½ in., 29 in. and 47 in., by 33 in. stroke, steam being supplied by a large boiler working at a pressure of 180 pounds per square inch. The vessel has been built to the order of Messrs. G. Lamy & Cie, of Caen, for whom the builders have previously built seven steamers. A Cochran (Annan) Donkey Boiler with patent [illegible] furnace has been supplied and fitted.

LAUNCHES—Scotch.

Pulganbar.—On January 19th, there was launched at Grangemouth a passenger and cargo steamer, which has been built to the order of the North Coast Steam Navigation Company, of Sydney, N.S.W., through Messrs. Hendry, M'Callum & Co., of Glasgow. The vessel has been constructed to British Corporation requirements for the Australian coast service, and is of the following dimensions: Length 228 ft, breadth 35 ft., and depth 20 ft. 11 in. to shelter deck. Accommodation for a large number of first and second class passengers is provided. A special installation of refrigerating machinery has been fitted with heavily insulated chambers for the carriage of a large quantity of butter. Quadruple expansion engines designed to give a high rate of speed will be fitted. Messrs. Wailes, Dove and Co.'s "Bitumastic" Enamels have been applied to the peaks, bunkers, tanks, etc., etc. Messrs. Matthew, Keenan and Co., Ltd., have the contract to cover the boiler and pipes with their patent non-conducting composition.

Burmah.—On January 20th, Messrs. Swan, Hunter and Wigham Richardson, Ltd., launched from their Wallsend shipyard the cargo steampship, *Burmah*, for the Rotterdamsche Lloyd, of which the managers are Wm. Ruys and Sons, of Rotterdam. The construction of the ship has been superintended by Mr. Petri on behalf of the owners. The vessel is 400 ft. long by 50¼ ft. broad, and 30½ ft. moulded depth. The triple expansion engines and boilers are being constructed by the Wallsend Slipway and Engineering Company, Ltd. The ship is to carry a deadweight of 7700 tons. Five large cargo hatchways are provided, and there will be eleven steam winches to expedite the loading and discharging of cargo. In all details the ship's outfit will be such as to make her a representative cargo liner of the best type.

Angola.—On January 22nd, there was launched from the Shipbuilding Yard of Messrs. David & William Henderson and Co., Ltd., Partick, a large steel screw cargo steamer, which they have constructed to the order of Messrs. Maclay and McIntyre, of Glasgow. This latest addition to the fleet of vessels owned by this firm is in length 416 ft. overall, breadth moulded 52 ft., with a depth of 29 ft. 10 in. moulded, having a gross tonnage of about 4950 tons, and will be classed in Lloyds 100A1 three deck rule. She has been fitted with all the latest improvements to ensure the rapid and safe working of the large cargo which she has been designed to carry, including nine powerful winches and also large derricks fitted at the hatches. A complete installation of electric light has been fitted throughout the vessel. Steam stearing gear is fitted amidships; the saloon and officers' accommodation is on the fore end of bridge deck and chartroom and wheelhouse have been built above this with a bridge which will give every facility to the officers in the navigation of the vessel. A set of triple expansion engines will be supplied and fitted by the builders, having cylinders 25 in., 41 in. and 67 in. diameter, by 51 in. stroke, also three large single ended boilers, working at a pressure of 175 lbs.

Merisia.—On January 23rd, there was launched from the yard of Messrs. Cochrane & Sons, Selby, a steel screw trawler, the principal dimensions being 130 ft. by 23 ft. 6 in. by 13 ft. 3 in. moulded. The vessel has been built to the order of Messrs. The Fleetwood Steam Fishing Co., Ltd., Fleetwood, and will be replete with all the latest improvements for the fishing trade. She will be fitted with powerful triple expansion engines by Messrs. Amos & Smith, Ltd., of Hull.

Itapura.—On January 24th, there was launched at Troon the twin-screw steamer, *Itapura*, which has been built to the order of Messrs. John M. Campbell & Son, Glasgow, for Brazilian owners. The vessel is the first of four similar steamers building for the same owners. Her dimensions are, *viz.*: Length overall 300 ft., length between perpendiculars 288 ft., breadth moulded 43 ft., depth moulded 18 ft. 9 in. She has been specially built for the passenger and mail service, and is fitted for a large number of first and second class passengers. The machinery, which will

develop 2000 i.h.p., consists of two [illegible] triple expansion engines, supplied with steam from [illegible] large cylindrical boilers. The vessel is designed for a speed of over 12 knots on a limited draught.

Cairnhill. On January 24th, Messrs. Archd. McMillan and Son, Ltd., Dumbarton, launched the steel screw steamer, *Cairnhill*, which they have built to the order of Messrs. Macbeth & Co., Ltd., Glasgow, and which is a duplicate vessel to the "Cairnhill," recently built by them for this firm. The vessel is of the following dimensions, viz.: Length between perpendiculars 400 ft., breadth 52 ft., depth 30 ft., and is constructed with [illegible] holds. Large water ballast capacity is provided for in cellular double bottom, both peak, and in deep tank amidships. The vessel is designed to carry a deadweight of about 5900 tons with Lloyd's summer freeboard. Accommodation for captain, officers and engineers is on top of bridge deck, while the crew are berthed forward. The vessel is fitted out in a very complete manner, having an installation of electric light, etc. The machinery is by Messrs. David Rowan and Co., Glasgow, and both vessel and machinery have been built under special survey of Lloyd's for their highest class. Messrs. Walker, Dove & Co.'s "Bitumastic" Enamels have been applied to the tanks, bunkers, [illegible], etc., and their patent "Bitumastic" Covering to the tank tops.

Beltana. On January 24th, Messrs. Caird & Co., at Greenock, launched the twin screw steamer, *Beltana*, built to the order of the Peninsular and Oriental Steam Navigation Company. The *Beltana* is a sister ship to the *Corfu* launched in September from the same yard, and, like that vessel, is intended for the Company's branch service to Australia, via the Cape. For her first voyage the *Beltana* created a record on her maiden voyage, completing the passage in 37½ days. The *Beltana* is a vessel of the intermediate class, of 11,000 tons gross, and her principal dimensions are: Length 515 ft., breadth 62 ft. 6 in., and depth 42 ft. Messrs. Walker, Dove & Co.'s "Bitumastic" Enamels have been applied to the bunkers, double bottom, and their Patent "Bitumastic" Covering to the tank tops. Messrs. Matthew Keenan & Co., Ltd., have the contract to cover the boilers and steampipes with their patent non-conducting composition.

Risaldar. On February 2nd, there was launched at Sunderland, a passenger and cargo steamer for Messrs. Turner and Co., Liverpool. The vessel is classed 100A1 at Lloyd's, and conforms to Board of Trade requirements for a passenger steamer. The first class state rooms are arranged on the bridge deck. The cargo gear is of the best type, and the deck machinery is of the most approved description.

Barata. On February 3rd, there was launched at Whitehaven the single screw steamer, *Barata*, built for the Persian Gulf and Karachi service of the British India Steam Navigation Company. The vessel is 300 ft. in length, 40 ft. in breadth, 25 ft. 9 in. in depth, and of 3300 tons gross. She will carry a limited number of first and second class passengers, as well as a large number of natives, for whom special accommodation will be provided.

Mascara. On February 5th, Messrs. Alex. Stephen and Sons, Limited, Linthouse, launched a large twin screw steamer for Messrs. Mackay & McIntyre, Glasgow. The vessel has been constructed to Lloyd's highest class, and her dimensions are: Length 323 ft., breadth 52 ft., depth 30 ft. She has been designed and fitted out as a first class deadweight carrier, with all the latest and most approved appliances. The machinery, which has been supplied by the builders, consists of a set of triple expansion engines, having cylinders 25 in., 41 in., and 67 in. diameter, with a stroke of 51 in., and supplied with steam from three large single ended boilers fitted with Howden's forced draught.

Strathmore. On February 5th, there was launched at Greenock the steamer, *Strathmore*, a vessel of 4000 tons gross, which has been built for Messrs. Burrell & Son, Glasgow. The dimensions of the vessel are: Length 300 ft., breadth 52 ft. 3 in., depth 28 ft., and deadweight carrying capacity 7150 tons, on a draught of 23 ft.

Sant Tookaram. There has been launched recently at Grangemouth the steamer, *Sant Tookaram*, which has been built for service in East Indian waters. The dimensions of the vessel are: Length 180 ft., breadth 28 ft., depth to main deck 10 ft., and depth to [illegible] deck 17 ft. 10 in. Machinery designed to give a high rate of speed will be supplied.

Princess Royal. At Dundee there has been launched a passenger steamer, named *Princess Royal*, for Messrs. M. Langland & Son, Liverpool and Glasgow. The vessel which is to be engaged in the company's sailings from the northern portion of Scotland, is 303 ft. in length overall, 38 ft. in breadth moulded, 17 ft. 3 in. in depth moulded, and of about 1267 tons gross. Accommodation is provided for about 200 first class passengers.

LAUNCH—Irish.

Makarini.—On February 3rd, Messrs. Workman, Clark and Co., Ltd., Belfast, launched from their South Yard the twin screw steamer, *Makarini*, built by them for Messrs. The Tyser Line, Limited, London. The *Makarini*, 480 ft. in length, with a gross tonnage of [illegible] tons, is a vessel of the shelter deck type, and has been built under special survey, for the highest class in Lloyd's Register. The cargo space is divided into five spacious holds, three of these being insulated for the carriage of frozen meat cargoes, of which the Tyser Line have made a specialty. For the preservation of these cargoes an efficient installation of refrigerating machinery on the carbonic acid system has been arranged. Each of the holds is furnished with a large hatchway fully equipped with steam winches, derricks, and other gear necessary for successfully handling a meat cargo. Accommodation for about 750 steerage passengers is provided in rooms on the upper 'tween decks; the rooms being large, well lighted and ventilated, and fitted with wash basins. A comfortable smoking room and lounge are provided on the shelter deck, and a large dining saloon to accommodate all the passengers at one sitting is arranged on the upper deck. Accommodation for the ship's officers and engineers has been arranged in a large steel deckhouse amidships, the captain's rooms being placed in a steel house on the bridge deck. The propelling machinery consists of two sets of triple expansion engines complete with all the necessary auxiliary appliances, and supplied with steam from four single ended steel boilers, working under forced draught.

TRIAL TRIPS.

Yi Loong. On January 20th, this vessel, which was launched on the 28th October last, was taken for trial at sea, when a speed of over 11½ knots was attained on the measured mile. She has been built to the order of the Manchu Steamship Co., Ltd., by Messrs. J. Priestman and Co., Ltd., of Sunderland. She has been built specially for Eastern Trade, and has all the modern machinery for quick handling of cargo, with some accommodation for passengers. See launches, January.

Marguerite. On January 23rd, Messrs. Osbourne Graham and Co., sent to sea for her official trial trip the steel screw steamer, *Marguerite*, which is the third vessel they have recently constructed to the order of Fernand Bouet, Esq., of Paris. Engine and boilers have been supplied by the North Eastern Marine Engineering Co., Ltd., of Sunderland, and during the loaded trial a speed of 10 knots on a 4 hours' run was easily attained. After the trial the vessel proceeded on her first voyage to Paris. See launches, February.

Ardoyne. On January 25th, the new steamer, *Ardoyne*, built by the Sunderland Shipbuilding Co., Ltd., was taken to sea on her official trial, which was carried out under favorable conditions, everything worked well, and a speed of about 10½ knots was easily maintained. Those present on behalf of the Owners expressed themselves as very highly pleased with the vessel and her machinery. See launches, February.

Margaret.—On January 25th, the s.s. *Margaret*, of about 2000 tons deadweight, built to the order of the Rederiaktiebolaget Nordstjernan, of Stockholm (Axel Axelson Johnson, Manager), by the Caledonia Shipbuilding Co., Dumbarton, and engined by Messrs. David Rowan & Co., Glasgow, was tried at Victoria Bay. The *Margaret* is of the well deck type, with raised quarter deck, [illegible] and forecastle [illegible], and has been specially strengthened above Lloyd's requirements for the severe ice trade. After the trial, which was highly satisfactory, the vessel proceeded to sea.

Number 7.—On January 25th, the steel twin-screw hopper barge Number 7, built by Messrs. Lobnitz & Co., Ltd., for the Clyde Navigation Trustees, carried out successful trials. This hopper, which is of the following dimensions, 200 ft. 55 ft. by 15 ft. 6 in. moulded, has been built to the rules and classification of the British Corporation Registry.

Saltburn.—On January 26th, the fine steel screw cargo steamer, *Saltburn*, built by Sir Raylton Dixon & Co., at their Cleveland Dockyard, Middlesbrough, to the order of Messrs. Furness Withy & Co., Ltd., West Hartlepool, proceeded to sea for her official trials. The trials passed off most successfully, and the vessel returned to the Wear to load. She will be commanded by Captain J. W. Anderson. See launches, January. A Cochran (Annan) Donkey Boiler with patent seamless furnace has been supplied and fitted.

Prophet.—On January 27th the new steel screw steamer, *Prophet*, built at Willington Quay-on-Tyne, for Messrs. John Gaff & Co., Glasgow, went to sea for her official trial trip, when she attained a mean speed of over 10 knots, which was considered very satisfactory by all concerned. This vessel, which is 348 ft. long, is classed 100A1 at Lloyd's on single deck rule. The propelling machinery, which has been constructed and fitted by the North-Eastern Marine Engineering Company, Ltd., at their Northumberland Engine Works, Wallsend-on-Tyne, consists of a set of their latest type of triple expansion engines, having cylinders 24 in., 40 in., and 65 in., by 42 in. stroke, steam being supplied by two large steel boilers working at a pressure of 180 lbs. per square inch. After the trial the vessel proceeded on her voyage under the command of Captain Dunn.

Princess Sophia.—The new Canadian Pacific Railway steamer, *Princess Sophia*, built at Paisley, has attained a speed of 14 knots on trials. This is in excess of contract requirements. The *Princess Sophia* is a single screw steamer, 245 ft. in length, with triple expansion engines. She has been specially designed for service on the Pacific Coast, and has accommodation for about 100 second class passengers. See launches, December

Gunbar.—On January 30th, the twin-screw steamer *Gunbar*, built at Ardrossan for the North Coast Steam Navigation Company, Sydney, N.S.W., ran trial trips on the Clyde. The machinery worked satisfactorily, and a speed in excess of the contract requirements was attained. The *Gunbar* has been built under the superintendence of Messrs. Hendry, M'Callum & Co., Glasgow, agents in this country for the owners, and to take the highest class of the British Corporation Registry. For Launch, see January issue.

Deptford.—On January 31st, the screw steamer, *Deptford*, built by the Blyth Shipbuilding & Dry Docks Co., Ltd., for Messrs. W. Cory & Son, Ltd., London, was taken to sea for trial. The representatives of owners, builders and engineers present during the trial were highly satisfied with the results obtained. See launches February. A Cochran (Annan) donkey boiler with patent seamless furnace has been supplied and fitted.

Arab.—This high class cargo vessel, built by Messrs. Joseph L. Thompson & Sons, Limited, of the North Sands Shipbuilding Yard, Sunderland, and specially constructed to the order of Messrs. The Bedouin Steam Navigation Company, Ltd., of Liverpool, was recently taken to sea on her official trial trip, which was most satisfactory in every way, the vessel, fully laden, easily maintaining a mean speed of well over eleven knots. See launches, January.

Arracan.—On February 9th, the s.s. *Arracan*, built by Messrs. Denny, of Dumbarton, for Messrs. P. Henderson and Co.'s Rangoon trade, carried out successful trials on the Clyde. The vessel is classed with the British Corporation Registry. For Launch, see February issue.

Baron Jedburgh.—On February 10th, the steel screw steamer *Baron Jedburgh*, built by Messrs. A. Rodger & Co., Port Glasgow, and engined by Messrs. D. Rowan & Co., Glasgow, ran successful trials on the Clyde. The vessel has been built for Messrs. Hugh Hogarth & Sons, Ardrossan, and is classed with the British Corporation Registry. For Launch, see February issue.

Geddington Court.—On February 1st, the steel screw steamer, *Geddington Court*, built by the Northumberland Shipbuilding Company, Limited, Howden-on-Tyne, to the order of Messrs. Haldinstein & Co., Ltd., London, for the Court Line Limited, left the Tyne to undergo her official trial trip. Although very rough weather prevailed, the trial trip proved successful in every way, and a speed of 10¾ knots was obtained. After trial trip the vessel proceeded to Cardiff under the command of Captain Cleghorn, to load for Colombo. See launches, February.

Windsor.—On February 12th, the s.s. *Windsor*, built by Messrs. Craig, Taylor & Co., Ltd., Thornaby Shipbuilding Yard, Stockton on Tees, was taken to sea for her loaded trial trip from the Tyne, which proved highly satisfactory. The vessel, which was fully loaded, carries close upon 10,000 tons deadweight, and during the whole of the trip everything worked with the greatest smoothness, a speed of 10½ knots being maintained. Immediately after the trial, the vessel left for Port Said under command of Captain David Owen. It is interesting to note that the builders, Messrs. Craig, Taylor & Co., Ltd., have secured order for two similar vessels for the same owners. See launches, February.

BOARD OF TRADE EXAMINATIONS.

1912	Extra First Class.	
Jan. 25th	Earl, G.	Ex 1C Sunderl'd
,, 25th	Gray, G.	Ex 1C N.Shields
,, 25th	Hall, C.	Ex 1C Barrow
,, 25th	Jenkins, G.	Ex 1C Cardiff
,, 25th	Reed, G.	Ex 1C N.Shields
,, 25th	Whyte, J.	Ex 1C Dundee
Feb. 1st	Blane, H	Ex 1C Liverpool
,, 1st	Dye, C.	Ex 1C London
,, 1st	Hogg, J.	Ex 1C Liverpool
,, 1st	Quine, J.	Ex 1C Liverpool

NOTE—1C denotes First Class; 2C Second Class.

November 23rd, 1911.

Duncan, G	2C Liverpool
Dundas, S.	1C South'ton
Evans, W	1C Cardiff
Ford, F.	2C W. Hart'l
Forrest, R.	1C Leith
Graham, J.	1C N.Shields
Horsford, S.	2C South'ton
Houghton, R.	1C Liverpool
Jack, W.	1C Liverpool
Jones, L.	1C Liverpool
Kean, G.	1C Glasgow
Keans, A.	1C W. Hart'l
Leahy, W.	2C Plymouth
Lochhead, J.	1C Glasgow
MacDonald, H.	2C Liverpool
Mackey, W.	2C W. Hart'l
McKinley, C.	1C W. Hart'l
Mitchell, T.	2C W Hart'l
Morris, W.	1C W. Hart'l
Morton, H.	2C N.Shields
Murie, F.	2C Glasgow
Neill, W.	1C Leith
Ogle, E.	1C London
Penn, J.	1C Leith
Perry, A.	2C South'ton
Pile, J.	1C South'ton
Pritchard, A.	1C Cardiff
Rust, R.	2C London
Sinclair, W.	2C N.Shields
Smiles, M.	2C Barrow
Stevenson, J.	1C Glasgow
Stones, J.	2C Liverpool
Strawson, C.	1C London
Stubbs, N.	1C Glasgow
Taylor, T.	2C Liverpool
Terry, W.	1C London
Vichoff, I.	1C Liverpool
Webb, W.	1C London
Welsh, A.	1C Leith
Wetherall, G.	1C N.Shields
Wilson, J.	1C South'ton
Wregg, B.	1C Liverpool

November 30th.

Allan, J.	2C Greenock
Bateman, T.	2C N.Shields
Battersby, W.	2C Liverpool
Bott, J.	1C London
Burkett, W.	1C N.Shields
Calnon, Lewis	1C Sunderl'd
Clark, A.	2C Aberdeen
Crerar, D.	2C N Shields
Davey, L.	2C Liverpool
Fanning, F.	2C Greenock
Flett, D.	2C Aberdeen
Forbes, W.	1C London
Goulding, C.	2C Londn'ry
Gray, D.	2C Liverpool
Gray, G.	2C N Shields
Halliday, H.	1C Sunderl'd
Hill, R.	2C N.Shields
Jackson, H.	2C N.Shields
Jewsbury, E.	2C Hull
Kean, J.	1C N.Shields
Keith, H.	2C Greenock
Kerr, A.	1C Greenock
Laurie, T.	1C Greenock
MacDougall, N.	2C Greenock
Mann, S.	2C N.Shields
Matthew, A.	1C London
Metcalf, J.	1C Sunderl'd
Middleton, W.	2C Greenock
Middleton, J.	2C Aberdeen
Minty, G.	2C Aberdeen
Pickering, J.	1C N.Shields
Profit, G.	2C N.Shields
Price, J.	1C Liverpool
Rankine, A.	2C London
Rees, D.	1C London
Rimmer, T.	1C Liverpool
Rossiter, R.	2C Sunderl'd
Roberts, W.	2C Liverpool
Salmond, N.	2C Bristol
Scales, W.	1C London
Sim, G.	1C London
Thornton, T.	1C Bristol
Thurston, E.	2C London
Torbit, J.	2C Greenock
Yorke, W.	2C Sunderl'd

December 7th.

Arnold, A. .... 1C London
Atwood, E. .... 1C Cardiff
Bailey, H. .... 2C Falmouth
Barry, J. ..... 1C Liverpool
Blake, W. ..... 2C Cardiff
Brattlebank, A. 2C Liverpool
Brown, J. ..... 1C Glasgow
Brunton, E. .. 2C N.Shields
Burdock, A. .. 1C Southton
Cairns, R. .... 1C N.Shields
Campbell, P. .. 2C Glasgow
Clark, R. ..... 1C Glasgow
Clark, T. .. .. 2C Glasgow
Dutt, P. ..... 1C Leith
Edney, W. .... 2C Cardiff
Edwards, W. .. 2C London
Glencross, T. .. 2C Liverpool
Jarvie, J. ..... 1C Glasgow
Jeffrey, F. .... 2C Cardiff
Joyce, T. ..... 2C Cardiff
Kilner, R. .... 1C London
Lang, J. ..... 2C London
Larkman, A. .. 2C South'ton
Lewis, A. .... 2C Cardiff
Longstaff, T. .. 1C N.Shields
McArthur, W. 2C Glasgow
McAuley, D. .. 1C Belfast
McCulloch, A. 1C Glasgow
MacIver, E. .. 2C Liverpool
Mackay, B..... 2C Liverpool
McNeill, W. 1C Glasgow
Marshall, R. .. 2C N.Shields
Merry, H. .... 1C Cardiff
Miller, A. .... 1C Glasgow
Mitchell, E. .. 2C Liverpool
Mitchell, W. .. 1C Cardiff
Monks, T. .... 2C N.Shields
Nelson, N. .... 1C Glasgow
Nicholson, N. .. 1C Leith
Paterson, B. .. 2C Cardiff
Phillips, J. .... 2C N.Shields
Rees, E. ..... 2C Cardiff
Rendle, F. .... 2C Falmouth
Robinson, H. .. 2C London
Rogers, E. .... 1C Cardiff
Skinner, V. .... 2C Cardiff
Taylor, M. .... 2C Leith
Tillie, J. ..... 2C Glasgow
Turner, J. .... 2C Glasgow
Wardropper, J. 2C N.Shields
Whitehouse, R. 2C South'ton
Wilson, R. .... 2C Glasgow

December 14th.

Aitken, D. .... 2C Greenock
Andersen, A. .. 2C Greenock
Arrowsmith, F. 1C Liverpool
Bailey, W. .... 2C Liverpool
Balmer, H. .... 1C Liverpool
Bennett, T. .... 2C N.Shields
Bullen, S. .... 2C N.Shields
Campbell, J. .. 2C Dundee
Cherry, J. .... 2C Hull
Copland, A. .. 2C Dundee
Cumming, A. .. 1C Greenock
Dudgeon, G. .. 2C Liverpool
Duguid, J. .... 1C Greenock
Hunter, F. .... 1C London
Iceland, A. .... 1C Liverpool
Inches, W. .... 1C Hull
Ingleby, G..... 1C Hull
Irvine, C. ..... 2C Greenock
Kerr, G. ..... 1C Greenock
Kitching, F. .. 1C N.Shields
Kyle, H. ..... 1C Liverpool
Lambert, L. .. 1C Hull
McCall, C. .... 1C Greenock
McCollam, D.. 2C Greenock
Macfarlane, J. 1C Greenock
McLeod, A..... 1C Greenock
MacPherson, R. 1C Greenock
MacRaild, D... 2C Greenock
Marsh, J. ..... 1C Liverpool
Mellett, J. .... 2C Dublin
Patterson, R. .. 2C Belfast
Pellew, E. .... 2C Liverpool
Pentelow, J. .. 2C N.Shields
Pollard, E. .... 1C N.Shields
Rule, T. ..... 1C Liverpool
Salter, J. ..... 1C Liverpool
Schofield, R. 2C N.Shields
Stephen, W. .. 1C Greenock
Stewart, J. .... 1C Greenock
Strent, G. .... 2C Greenock
Sweet, G. .... 1C London
Taylor, A. .... 2C Dundee
Taylor, G. .... 1C Greenock

December 21st

Aitkenhead, A. 1C N.Shields
Anderson, J. .. 2C Leith
Atkinson, A. .. 2C N.Shields
Bartlett, C. .. 2C N.Shields
Brown, H. .... 1C Cardiff
Butterwick, R. 2C W. Hart'l
Carr, R. ..... 2C London
Cometson, A. .. 2C Cardiff
Cook, C. ..... 1C Liverpool
Cooper, J. .... 1C Cardiff
Devonald, O. .. 1C Cardiff
Duffus, J. .... 1C Glasgow
Fraser, H. .... 1C Glasgow
Goddard, C. .. 1C N.Shields
Gollan, J..... 1C London
Harley, H. .... 2C London
Hewitson, C. .. 1C W. Hart'l
Hobbs, W. .... 1C W. Hart'l
Holmes, A. .... 2C London
Huggins, J..... 2C London
Hyett, B..... 2C Cardiff
Ironside, G. .. 1C Leith
Lashmar, J. .. 1C South'ton
Lewis, T. .... 2C Cardiff
Littledale, W. 2C Liverpool
McCarthy, A... 1C Glasgow
McKevit, J..... 1C Cardiff
Montgomery, A. 1C South'ton
Morritt, W. .. 2C Glasgow
Oswald, E. .... 2C W. Hart'l
Pollard, H. .... 1C Liverpool
Pullen, F. .... 1C London
Rae, A. ..... 1C Glasgow
Reive, G. ..... 1C N.Shields
Richardson, P. 1C Liverpool
Ritchie, W..... 1C W. Hart'l
Roberts, F. .. 1C London
Robertson, P... 2C Glasgow
Robinson, J. .. 1C N.Shields
Rowell, J. .... 2C N.Shields
Scott, R. ..... 2C Leith
Smallwood, T. 2C W. Hart'l
Smith, F. .... 2C Cardiff
Stoddart, W. .. 2C W. Hart'l
Sullivan, D. .. 2C Barrow
Swinney, J. .. 2C N.Shields
Tennent, G. .. 1C Glasgow
Thompson, W. 1C London
Thornton, A. .. 2C Liverpool
Waite, F. ..... 1C Liverpool
Walker, H. .... 2C W. Hart'l
Watt, J. ..... 1C N.Shields
White, J. .... 1C Glasgow

December 28th.

Adamson, T. .. 1C Hull
Allitree, W. .... 2C London
Banks, F. .... 1C Liverpool
Banks, T..... 2C N.Shields
Brown, J..... 1C Greenock
Calver, H. .... 2C London
Campey, W. .. 2C London
Carmichael, A. 1C Greenock
Cockrill, C. ... 1C Hull
Colquhoun, W. 1C Greenock
Cook, R. ..... 1C Greenock
Corsie, W. .... 2C N.Shields
Crew, W. .... 2C Liverpool
Cummings, K. 2C Londonderry
Dixon, T..... 1C N.Shields
Douglass, J. .. 1C N.Shields
Duff, B. ..... 2C Liverpool
Eltus, J. ..... 1C N.Shields
Fitton, G. .... 2C Liverpool
Fox, F..... 2C N.Shields
Freeman, J..... 1C London
Gordon, W. .. 1C N.Shields
Harle, E..... 1C N.Shields
Harrison, S. .. 1C N.Shields
Hayes, E. .... 2C Bristol
Hotham, R. .. 2C Liverpool
Hore, L. ..... 2C Liverpool
Humphreys, H. 2C London
Johnson, E..... 1C N.Shields
Kynman, T. .. 2C Hull
Lafrenais, G. .. 1C Greenock
Lamberd, W... 1C N.Shields
Lee, G..... 1C Liverpool
Lithgow, O. .. 1C N.Shields
McBain, J. .... 1C Aberdeen
O'Sullivan, J... 2C Greenock
Rees, H. ..... 1C Bristol
Rothery, C. .. 1C Liverpool
Sewell, H. .... 1C Liverpool
Slade, W. .... 1C Bristol
Smith, A..... 2C Aberdeen
Smythe, T..... 2C N.Shields
Souter, W. .... 2C Aberdeen
Spence, J. .... 1C Greenock
Symes, R. .... 1C Greenock
Tanner, W..... 1C Liverpool
Thorpe, E. .... 1C Hull
Turner, J. .... 1C Liverpool
Wilson, W..... 1C Liverpool

January 4th, 1912.

Allan, J. ..... 1C Leith
Birrell, J..... 1C Leith
Bryce, J. ..... 2C Glasgow
Davidson, J. .. 2C London
Drummond, D. 1C Glasgow
Ferguson, S. .. 2C Glasgow
Forrester, A. .. 2C Glasgow
Geddes, J. .... 1C Leith
Gibson, W. .... 1C Glasgow
Hain, J. ..... 1C Falmouth
Haworth, H. .. 2C Glasgow
Henderson, J.G. 2C Glasgow
Liddell, H. .... 2C Leith
McClay, T..... 1C Liverpool
MacSween, A. 1C Glasgow
Miller, W. .... 2C Glasgow
Mills, D. ..... 2C Glasgow
Mungall, D. .. 1C Glasgow
Nelson, W..... 1C Leith
Platt, H. ..... 2C London
Scotland, T. .. 2C Leith
Smith, J. ..... 1C Leith
Swaries, G. .... 1C Glasgow
Thomson, G. .. 1C Glasgow

January 11th.

Adams, G. .... 1C London
Bradley, R..... 1C Hull
De Alegria, S. 2C Liverpool
Gummer, R. .. 1C London
Harding, A. .. 1C London
Horrocks, J. .. 1C Hull
Howes, R. .... 1C London
Illingworth, A. 1C Greenock
Johnston, W. .. 1C Greenock
Mitchell, A..... 1C Liverpool
Murison, A. .. 1C Liverpool
Pickhaver, G. 1C London
Renfrew, W. .. 2C Greenock
Sparke, E. .... 2C Liverpool
Watt, W. .... 1C Liverpool

January 18th.

Abraham, A. .. 2C South'ton
Amour, J. .... 2C Leith
Anderson, J. .. 1C Glasgow
Averett, E. .... 2C London
Bell, W. ..... 1C Cardiff
Cay, M. ..... 1C South'ton
Clark, N. ..... 2C London
Clendesley, J. 1C Glasgow
Dick, J. .... 1C Glasgow
Douglass, N. .. 1C N.Shields
Finney, B. .... 2C N.Shields
Forster, N. .... 2C N.Shields
Foster, J. .... 2C N.Shields
Hayes, C. .... 1C London
Jackson, J. .... 2C N.Shields
Jefferies, W. .. 1C London
Kennedy, S. .. 1C Glasgow
Lewis, J. ..... 1C Cardiff
MacAdam, R. .. 1C Glasgow
Macfarlane, J. 1C Glasgow
Mackinnon, K. 1C London
Manson, S. .... 1C Glasgow
Mattison, J..... 2C Leith
Merrick, R..... 1C Cork
Millard, G. .... 1C South'ton
Morrice, W. .. 1C Glasgow
Pritchard, J. .. 1C Liverpool
Reid, A. ..... 1C Liverpool
Robinson, J. .. 2C Liverpool
Rowe, W. .... 2C South'ton
Russell, A. .... 2C Liverpool
Ryott, J. ..... 2C N.Shields
Saunders, W... 2C Cardiff
Scrivener, R. .. 1C Liverpool
Smith, J. ..... 2C W. Hart'l
Thomson, A. .. 2C Glasgow
Wanless, J. .... 1C N.Shields
Wheeler, F. .. 1C London
Williams, E. .. 2C Cardiff
Williams, V. .. 1C Cardiff
Wood, J. ..... 2C W. Hart'l

January 25th.

Adams, T. D... 1C London
Barron, W. .... 1C Aberdeen
Bennett, B..... 1C N.Shields
Black, A. ..... 1C Aberdeen
Blair, W..... 1C Greenock
Bond, J. ..... 2C Hull
Brooking, E. .. 1C N.Shields
Buglass, J. .... 2C N.Shields
Burnham, F. .. 1C Sunderl'd
Cassie, F. .... 1C Aberdeen
Clark, R..... 1C Sunderl'd
Derricks, A. .. 1C N.Shields
Drummond, A. 1C Liverpool
Ferguson, J. .. 2C Londn'ry
Franckeiss, E. 2C London
Gilbertson-Pritchard, G. 2C Liverpool
Howe, B. .... 2C Aberdeen
Hulsmeier, W. 1C Sunderl'd
Jackson, W. .. 1C Sunderl'd
Jamieson, D. .. 2C London
Jones, M..... 1C Bristol
Joubert, D. .... 1C London
Macfarlane, J. 1C Greenock
McIver, T. .... 1C N.Shields
Meld, W. .... 1C Sunderl'd
Morrison, A. .. 1C Liverpool
Mortimer, J. .. 1C Aberdeen
Murray, A. .... 2C Aberdeen
Randall, T. .... 2C London
Reid, A. ..... 2C Liverpool
Scott, J. ..... 1C Aberdeen
Shand, M. .... 2C London
Simon, H. .... 1C Liverpool
Steers, A. .... 2C London
Stuart, G. .... 1C Greenock
Sylvester, E. .. 2C Hull
Thirkel, F. .... 1C London
Todd, F. ..... 1C London
Voger, H. .... 1C Sunderl'd
White, S..... 2C N.Shields
Wilson, C. .... 1C N.Shields

February 1st.

Allan, A.	2C	Leith
Ashley, A.	2C	N. Shields
Barker, W.	2C	Cardiff
Blackett, J.	2C	South'ton
Blanchflower, J.	1C	N. Shields
Brown, C.	1C	London
Brown, O.	1C	N. Shields
Burdis, A.	2C	N. Shields
Burgoyne, H.	1C	London
Campbell, J.	1C	Glasgow
Davidson, C.	1C	Leith
Dow, J.	2C	Leith
Fell, G. W.	2C	London
Grainger, F.	2C	London
Grant, G.	1C	London
Grierson, F.	2C	Glasgow
Hamlett, H.	1C	Cardiff
Hayes, I.	1C	Belfast
Hodgson, S.	2C	London
Howlett, J.	1C	Liverpool
Kerr, A.	2C	Glasgow
Kinnear, J.	1C	Leith
Little, G.	1C	Liverpool
Loraine, J.	2C	Leith
McCrindle, W.	1C	Glasgow
Mackenzie, J.	1C	South'ton
Mackie, D.	1C	Glasgow
Mackinnon, J.	2C	Glasgow
Mann, E.	1C	Leith
Morgan, J.	1C	Glasgow
Park, H.	2C	London
Parrott, S.	2C	Cardiff
Revingdon, W.	1C	N. Shields
Richer, S.	1C	London
Roberts, D.	1C	Liverpool
Ruddick, W.	1C	London
Shepherd, H.	1C	Cardiff
Shilling, E.	2C	Cardiff
Smith, H.	1C	London
Stuart, J.	2C	N. Shields
Tyler, F.	2C	Leith
Waid, W.	1C	London
Ward, I.	2C	London
Westhorp, H.	1C	Liverpool

February 8th.

Anderson, J. E.	1C	N. Shields
Brown, R.	2C	London
Carswell, J.	1C	Glasgow
Clarke, W.	1C	N. Shields
Dobinson, E.	2C	N. Shields
Esplin, N.	2C	Liverpool
Ewart, J.	2C	N. Shields
Fillery, J.	2C	N. Shields
Hamilton, J.	2C	Glasgow
Harvey, J.	2C	Glasgow
Hately, W.	2C	N. Shields
Kerr, T.	1C	Glasgow
Logan, J.	2C	N. Shields
McBride, J.	2C	Glasgow
McGinty, J.	2C	Liverpool
Millican, D.	2C	Liverpool
Paton, A.	2C	N. Shields
Platt, J.	2C	London
Renwicke, W.	2C	N. Shields
Rewcastle, R.	1C	N. Shields
Roberts, O.	1C	Liverpool
Rook, S.	2C	N. Shields
Shuttleworth, C.	2C	N. Shields
Smith, T.	1C	Glasgow
Stevenson, W.	1C	N. Shields
Tholen, C.	2C	Liverpool
Walton, W.	2C	N. Shields
Watling, D.	1C	London
Weir, J.	1C	Glasgow
White, W.	1C	London

February 15th.

Bailley, F.	2C	Greenock
Banyard, F.	1C	London
Brammell, J.	2C	N. Shields
Brown, G.	1C	N. Shields
Callow, F.	2C	Liverpool
Crawford, J.	1C	Greenock
Cushing, G.	2C	London
Dall, A.	1C	Liverpool
Fisher, A.	2C	Liverpool
Griffiths, E.	2C	Liverpool
Hook, J.	2C	N. Shields
Jackson, W.	2C	Liverpool
Jainaja-Ercilla, C.	2C	Liverpool
Johnson, F.	2C	Liverpool
Jones, J.	2C	Liverpool
Kay, R.	2C	Dundee
Kerr, C.	2C	Liverpool
Lime, A.	1C	Dundee
McInnes, A.	2C	Greenock
McKenzie, W.	2C	London
MacKinnon, C.	2C	Greenock
Mays, W.	1C	Liverpool
Mearns, S.	1C	London
Miller, D.	2C	Hull
Murphy, H.	2C	N. Shields
O'Beirne, A.	2C	Liverpool
Parker, S.	2C	Liverpool
Patterson, A. J.	2C	N. Shields
Peatling, W.	2C	London
Riddle, R.	2C	London
Stephenson, G.	1C	N. Shields
Taylor, G.	2C	N. Shields
Thompson, T.	1C	N. Shields
Virtue, O.	1C	N. Shields
Wadsworth, E.	1C	Liverpool
Waller, C.	1C	Liverpool

The Marine Engineer and Naval Architect Patent Record.

Compiled by Messrs. E. P. Alexander & Son, Chartered Patent Agents, 306, High Holborn, London, W.C.

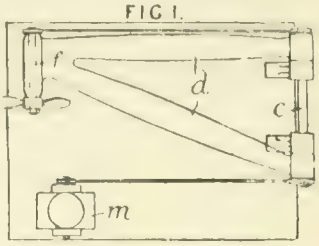
22,732. Ships' Plating. The plates forming the hulls of ships and boats are creased, embossed, or joggled near to

FIG. 4.

one end, the opposite end being arranged to overlap the embossed end of the adjacent plate, maintaining the continuity of the surface. The ribs thus formed are situated athwartships.

23,357. Driving Arrangements for Ships. Comprises apparatus for driving a propeller from the deck in which an arm is mounted to turn on a shaft transmitting the power. Fig. 1 shows a plan wherein the arm lies on the deck. The shaft *c* on which the arm *d* turns is fitted at each end with

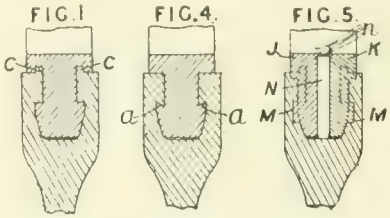
FIG. 1.



a belt, chain or tooth wheel, one of which receives the power from the motor *m* and the other transmits the power by a belt, chain or toothed wheel to the propeller shaft *f* mounted in the arm *d*. The arm *d* or a portion of it may be used as a transmission shaft.

23,387. Fixing the Blades of Turbines. The blades and distance pieces of a disc turbine have a tongue and groove engagement with the rotor, as shown at C, Fig. 1, or *a*, Fig. 4, to prevent lateral spreading of the walls of the blade groove. The roots are tapered as shown to obtain greater rigidity in the walls. The blades are inserted at a widened portion of

FIG. 1 FIG. 4. FIG. 5.



the blade groove. This portion is closed by a split distance-piece, the parts J, K, Fig. 5, of which are secured apart by a pin N. The pin is locked in place by tongues *n*, which are bent over the top of the pin. A screw may be used instead of a pin.

23,585. Turbines. In a turbine plant the faster-running high-pressure turbine is geared down to the work, while the slower-running low-pressure turbine is coupled direct. In a dynamo plant two dynamos *a*, *b*, Fig. 1, are driven by two turbines *c*, *d*. Reduction gearing *e* transmits the power from the turbine *c* to the dynamo, *a*, while the turbine *d*

FIG. 1.

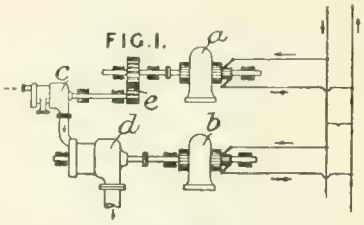
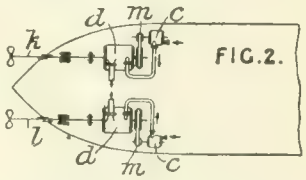


FIG. 2.



and dynamo *b* are directly coupled together. A four-shaft marine installation is described having two such sets of turbines, the dynamos *a*, *b* being replaced by propellor shafts. In a two-shaft marine installation the low pressure turbines *d*, Fig. 2, are coupled direct to the shafts *k*, *l* to which the high pressure turbines *c* are also coupled through reduction gearing *m*.

The Marine Engineer

And Naval Architect.

LONDON, APRIL, 1912.

THE NAVY ESTIMATES.

THE Navy Estimates for 1912-13 were issued on March 12th, with the usual explanatory memorandum of the First Lord. As was expected, they show a reduction on those of the previous year, but only to the extent of £307,100, the total sum being still over 44 millions. The principal increases occur in the wages vote, consequent upon the additions to the *personnel* in the last two years, and the further addition of 2,000 to be made this year; the armaments vote, which takes £300,000 more for projectiles and torpedoes, and for bringing the reserves of ammunition stores up to the full level; and the works vote, in which over a million is taken for the development of Rosyth and the two new locks at Portsmouth. On the other hand, there is a diminution of 1¼ millions in the vote for shipbuilding and repairs, new construction absorbing £13,971,527 as against £15,063,877 in 1911-12. While the Estimates therefore disappoint the hopes of those who looked for a substantial reduction in cost, they have been regarded on the whole as justified and necessary, even moderate in view of all the circumstances of the present situation. An important proviso is, however, contained in the opening words of the explanatory memorandum that, as the estimates have been framed on the assumption that the existing programmes of other naval Powers will not be increased, it will be necessary, in the event of such increases, to present supplementary estimates both for men and money.

The new shipbuilding programme comprises four large armoured ships, eight light armoured cruisers, twenty destroyers, and an uncertain number of submarines and auxiliary ships. While being less than the number in the last three programmes, the four capital ships should maintain, when completed in 1915, the standard of 60 per cent. superiority in "Dreadnoughts" over Germany, which Mr. Churchill announced to be the rule followed by the Admiralty in late years. To ensure this, however, an early beginning is expedient, not only to guard against delays brought about by labour troubles, but in fairness to the manufacturers of war material. It seems therefore a pity that the sum taken for the new programme is insufficient to begin three of the vessels before next winter, and the last of them before next spring. As usual, two of these big ships have been allotted to the public yards at Portsmouth and Devonport and the others to private firms. The eight "light armoured cruisers" are a new feature, and appear in place of the protected cruisers of recent years. They will be smaller in size, however, and will not be intended for the line of battle like most other vessels carrying vertical armour. Their duty will be to attend on the battle fleet for intelligence work and to protect it from torpedo attack, for which purpose they will possess great speed, and be strong enough to overtake and cut down an enemy's torpedo craft.

A number of important matters of policy were brought up during the debate on the Estimates, touching the material of the Navy, its organization and administration, and the *personnel*. Mr. Churchill was able to show that the docking accommodation, actual and prospective, was not unsatisfactory, though he foreshadowed further provision in 1916. The question of adopting oil as fuel was a perplexing one, for while in some points it was incontestably superior to coal, there was the matter of an adequate supply at reasonable prices, free from the danger of interruption in war time, to be considered. In regard to our shipbuilding resources in general, the First Lord dispelled any anxiety by the statement that while it was not possible to say if competitors could build as fast as we could, they were certainly not doing so in practice. The plans outlined to increase and maintain in a condition of greater readiness the striking force of the Navy were well received. Consequent upon them, a new "immediate reserve" of 5,000 men will be formed, while as regards the officers it is hoped to lessen the strain caused by the present shortage by promoting young warrant officers to commissioned rank, and enabling midshipmen to qualify as sub-lieutenant after 28 months' service, instead of 36 months as hitherto. The former plan, by opening the commissioned ranks to the lower deck on a scale and in a manner never attempted before, should prove popular with the men and beneficial to the Service.

MARINE OIL ENGINES.

THERE are one or two matters that have recently tended to arouse increased interest in the important subject of the merits of the oil engine for marine purposes. In the first place, the oil motor-engined ship *Selandia*, of which we give a description and illustration in this issue, has paid a visit to this country from Copenhagen, and has been inspected by naval and other engineers interested in the capabilities of this type of propulsive agent; further, the discussion of the application of the oil engine for this purpose has opportunely formed the subject of a paper and discussion at the Spring meetings of the Institution of Naval Architects last month. In the second place, the First Lord of the Admiralty, in presenting the Naval Estimates to Parliament, referred to the same subject, and admitted the fact that oil is incontestably superior to coal in reference to speed, convenience, cleanliness, economy and reduction of *personnel*, but beyond this there was little to encourage those who have for some

time past been prophesying the early advent of a battleship engined by internal combustion engines. As we have before pointed out, it is an impossibility for the Admiralty, on practical lines, to enter on an experiment of such a gigantically speculative nature as the building of a battleship, as has frequently been suggested, requiring 60,000 to 70,000 horse-power obtained by internal combustion engines. The basis of this view is the fact that up to the present 2,000 horse-power is the highest power factor for a single cylinder for this type of engine on an experimental basis only, and to contemplate the provision of thirty-five such cylinders for a battleship, in the present state of knowledge and practical experience, is quite beyond what one can expect from those responsible for the success of results obtained by safe progressive stages. Every thoughtful person must admit we are a long way off the suggested battleship at the present time. As is known, the Admiralty have already under construction an experimental 2,000-h.p. cylinder for an internal combustion engine, from which results may be obtained to justify the application of this type of engine to ships of moderate power. In France and Germany a great amount of pioneer work has been done in this direction, but the German experiments have been brought to a standstill in one instance, owing to a recent accident of an explosive character which has, we understand, wrecked the engine completely, and the scheme of making a 12,000-h.p. engine for application to the central shaft of one of the naval ships is thus seriously interfered with. Leaving this side of the question and turning to the much more hopeful one relative to the mercantile marine, it will be recognised that the scope of the problem is very different, as there is a great opening for ships having engines of from 2,000 to 3,000 horse-power, which can be dealt with in regard to cylinder sub-division, well within the recognised practice based on considerable experience on shore and a certain amount afloat. The results from the *Selandia* so far have appeared to be satisfactory; her trip across the North Sea was to a great extent at full speed, and the opinion of her pilot as to her behaviour after taking charge in bringing her up the Thames, was to the effect that the response to instructions from the bridge to the engine-room was remarkably quick, and the engine manœuvring and the answer of the helm were all that could be desired. So far so good, but the result of the round voyage from Copenhagen to the Far East and back again will be awaited with much interest, not only with regard to the normal working of the machinery from the point of view of economy, but as to the behaviour of the engines under conditions of stress and strain and their consequential effects. For example, what the action of the governor will be, and how far the momentum of the engine will be affected on the re-immersion of the propeller after the engine has been controlled by the governor. The question of fuel supply and storage was referred to by the First Lord of the Admiralty in his address, and it is interesting in this connection to note that at the present time there are no less than forty-four oil-tank steamers building in this country, having an aggregate carrying capacity of nearly 900,000 tons, and of these fourteen are being built for the Pearson Oil Syndicate for the transport of oil from Mexico to the Argentine Railways. All this tends to give the impression that in the near future there will be an organized distribution of liquid fuel at convenient depots in the trade routes, and oil will be in as good a position as coal.

PUBLISHERS' NOTICE.—Owing to the coal strike some delay in the delivery of this journal may occur, but readers should note that every effort is being made to have the journal on sale and in subscribers' hands at the usual time.

The Smooth-On Manufacturing Co., of Jersey City, N.J., have just issued their "Iron Cement No. 7" twenty-four page catalogue. This Smooth-On Iron Cement is for concrete work and is the latest Smooth-On product. It is a hydraulic chemical iron cement, prepared in powder form and used alone or in combination with Portland cement or with Portland cement and sand. It makes concrete heavier, denser, harder and waterproof. One of the great values of the cement is that it will bond concrete to concrete, which makes it invaluable for repairing defective spots in flooring. The Company will be pleased to send one of these catalogues to anyone sending name and address.

Proposed Memorial to Thos. Newcomen.—In order to perpetuate the memory of Thos. Newcomen, whose inventive genius gave to England two hundred years ago the pumping engine for the Cornish mines, it is proposed to erect a memorial at Dartmouth. The form which this may take will depend upon the response to the appeal for contributions, but should the aim of the promoters be met with sufficient liberality, the aim is to erect a museum with a reading-room attached. Newcomen was born at Dartmouth in 1663. The hon. treasurer of the fund is Mr. A. K. Gregory, manager, Lloyd's Bank, Dartmouth; and Mr. T. F. Caston, hon. secretary; the mayor of the borough, Mr. Chas. Peek, is chairman of the committee. There is a good illustration of the pumping engine of 1712 in Jamieson's "Steam and the Steam Engine," published by Chas. Griffin & Co.

Exhibition of Non-ferrous Metals.—This exhibition, which was to have been held in May, has now been postponed till June, and owing to the engagements of the Agricultural Hall it will only be open from June 17th to 27th, thus giving only one Saturday in place of two as in the first arrangement. The alteration has been rendered necessary owing to the enforced idleness of works preparing exhibits and the probable uncertainty of the railway traffic during May, as it was intended to give opportunity for workers in the various metals from the provinces to visit the exhibition and see their handiwork alongside that of others in kindred crafts. There are a large number of stands taken by manufacturing firms already, and no doubt many who could not see their way to have their goods prepared for May will now be able to book space. From the large number of well-known firms who have booked stands it may be inferred that the exhibition will be a most interesting one and by the liberalty of several members of firms the managing committee has been able to announce that substantial prizes will be offered for competitions among students connected with technical and art schools with a view to encourage craftsmenship. The subjects for competition already announced are for best work in copper, brass, muntz-metal, German silver and brass (combined), German silver or nickel, Britannia metal, pewter and tin, aluminium or aluminium alloy, rolled zinc and spelter, metal colouring, metal plating, gold, silver and precious metals, plumbing. To those who are interested in the metals which are included in the scope of the exhibition, the present announcement is commended, as we believe these exhibitions are of great value from an educational as well as from a manufacturers' point of view.

THE FLEETS OF THE MAIL LINES.

The Dover and Calais Route.

As I remarked recently in these notes the South Eastern and Chatham Railway has disposed of the best of its paddle steamships, the *Calais* and it was at first thought that she, like her two sisters would go to the ship-breaker direct. But this was not to be. The *Calais* has been re-sold and she is to have a new lease of life in Boulogne ownership.

Some excitement was caused by the announcement that a Dover and Calais steamship had been in collision on the 1st March. These vessels as a rule are navigated with wonderful skill and good fortune, for their route, intersecting as it does the great stream of traffic passing up and down the Channel is a peculiarly dangerous one. Yet this collision of the French paddle steamer *Le Nord* with the British steam collier *Rokanad* from Penarth to Rotterdam with a coal cargo, is said to have been only the third such accident within the last forty years to vessels on this station. Moreover, the most recent previous accident of these the contact of the French submarine *Pluviose* with the *Pas de Calais* sister ship to *Le Nord* was an accident of a special kind, and one which ought hardly to be reckoned amongst the ordinary dangers of the sea, at least from a passenger's point of view. Anyhow, *Le Nord*'s accident terminated fortunately enough. It took place in clear weather and but three miles from Dover Pierhead. From this circumstance the fact that alone of such steamers the two paddle steamships of the Chemin de Fer du Nord have no wireless installation, did not tend to jeopardise the injured steamer's chance of safety for owing to her proximity to Dover, those on shore saw the trouble she was in without the need for signalling, and tugs were at once despatched to the rescue, and the *Lord Warden* whose crew by this time must know all that is to be known about dealing with such emergencies—soon had the suctions of their hoses into the wounds of *Le Nord*, and their pumps going to keep down the water in the flooded compartments. *Le Nord*'s injuries were serious enough. She was cut into eight feet or so forward of her port paddle box, and the fires in her fore stokehold were extinguished. She was soon, however, towed into Dover and her passengers, some 286 in number, were despatched for London but two hours after schedule time, though I understand some of them found that their baggage had suffered from water damage. The vessel's injuries seem to have been sufficiently serious to make it necessary to beach her for tightening before sending her across the Channel to a home port for permanent repairs. Had the collision occurred in mid-channel there is no doubt that something more than water damage to baggage would have had to be deplored.

An unusual incident

took place in reference to the steamship *Rokanad*, belonging to Messrs. Watts, Watts & Co. She is a fine steamship of about 3,234 tons gross register built but eight years ago, and was on her voyage from Sagunto to Philadelphia with ore. Reaching St. Michael's in due course she proceeded thence on the 7th January after which nothing was heard of her. On the 14th February anxiety was expressed regarding her safety and 15 guineas was paid for reinsurances upon her. The days passed on and still no news was to hand. The view taken of her chances by those best qualified to form an opinion may be gathered from the fact that the rate went steadily up till it reached 65 guineas, or 66 per cent. She was thus practically uninsurable. Yet after thirty-eight days' silence news at last came to hand on the 20th February that she was safe at Bermuda, having been towed 400 miles into that port by the steamship *Cardiff* which had picked her up short of coal.

Arrangements and Amalgamations

seem to crowd thicker upon us as the months roll on. A few weeks ago announcement was made of the death at the age of sixty of Mr George Warren head of the Liverpool line of steamships known as the Warren Line, though in fact registered in the name of the White Diamond Steamship Company, Limited. At the end of February it was publicly stated that Lord Furness had purchased the line which comprises four vessels of an aggregate tonnage of 23,000 tons gross, for a price [illegible] of the 400 shares in the concern. The fleet will be continued under the new management in the Liverpool and Boston trade as heretofore, but a new company called George Warren & Co. Ltd. with a capital of [illegible] has been registered to take the immediate control.

Then came the arrangement between the Brocklebank Line of Liverpool and the Anchor Line of Glasgow with regard to a joint service to the Eastern ports, which the two companies have recently arrived. The closeness of the bond between the two organizations is evidenced by the fact that a representative of the Anchor Company is joining the Brocklebank board, and a joint office is to be opened in Liverpool. The fleet will be increased to twelve steamers, and appears on the surface, for Cunard and Anchor interests are now very closely identified, as the Brocklebank interests have been in touch with those of the Royal Mail.

The Coal Strike

has largely affected the sailings of steamships, even of the great passenger liners. The American Line for example which despatched the *St. Louis* to the westward on the 2nd March was to have sent the *Philadelphia* away on Wednesday the 12th—this being a White Star sailing day. But owing to the strike the sailing was abandoned and the announcement made that there will be no more despatches by this Company to New York during the continuance of the dispute. Little inconvenience must, however, have been caused to the intending passengers by the *Philadelphia*, as the *Olympic* was got away from Southampton but one day after the date of her proposed sailing. Speaking of the *Olympic* leads one to chronicle the difficulties which that vessel encountered through the loss of a propeller blade. She reached Southampton on her usual voyage from New York on the afternoon of 28th February and, arrangements having been made for docking her at Belfast, she reached the entrance to that port on the morning of the 1st March. But unfortunately she missed the tide by about half an hour, and so had to anchor in Carrickfergus roads. She is too big to handle by a night's tide and so it was not till the morning of the 2nd that she could be docked. The work of replacing the blade and of scraping and painting her vast hull was most expeditously accomplished, and she was undocked forty-eight hours later. But at that time a gale was blowing, the only suitable berth for her was not available, being occupied by her sister the *Titanic*, and so for safety she was taken back again into the dry dock to await more favourable weather conditions. The intention of despatching her with the United States mail of the 7th March had accordingly to be abandoned, and the Company's liner *Majestic* took it from Liverpool. On the 9th, however, the *Olympic* got away from Belfast and thus had the best part of a week at Southampton before her next sailing.

An Important Experiment

was made by the Cunard Company on the 18th February, when their new steamship the *Laconia* visited the port of Monaco in the course of her first Mediterranean voyage. The Government of the Principality has been busy developing its maritime resources and the Prince has deepened its harbour by some nine feet during the last few years. Further improvements are in progress. But a time has now arrived when they felt justified in inviting the attention of the big passenger shipowners to the benefits they are able to offer. Through the good offices of Mr Theodore Lumley, Consul General in London for the Principality, the call of the *Laconia* was arranged, and as unexpected did it prove that the *Cunard* [illegible] it is understood that during the season Monaco will take the place of Villefranche in the Company's itinerary. Other Companies are likely to follow the Cunard lead and Monte Carlo with its manifold allurements will be brought within the reach of scores passengers to [illegible] who merely go to spend the Easter and pleasure.

The White Star Line

have announced that a new steamship for the American trade which is to surpass in size all existing [illegible] trading in those waters, is to be called the [illegible] and of course to be [illegible]. An old Water name, by the way has just come out from the British [illegible]. This is the *Langley* [illegible] cargo [illegible] of the

White Star cargo service. She was a sister to the old *Cufic*, with whom she inaugurated the Cunard cattle and cargo line to New York. Built in the year 1889 at Belfast, by Messrs. Harland & Wolff, she was a single screw of 4,833 tons gross register, her length being 430 ft. As the trade developed these vessels were replaced by twin screws of far greater capacity and both sisters were sold out of the service. The *Rome*, taking the name of *Tampican*, went to the old West India and Pacific Steamship Company, and was in due course absorbed with the rest of that fleet by the Leyland Line. Then she had a turn in the service of another member of Mr. Morgan's combination, the Red Star Line, but eventually came back to Leyland's. Now she has gone to Norwegian owners and will, it is said, be employed in the whaling industry.

Speaking of the Red Star Line reminds one that this Company has ordered a vessel of about thirty thousand tons for their Antwerp and New York service. The new vessel will be constructed at Queen's Island by Messrs. Harland & Wolff. She will have a length of 670 ft. and be 70 ft. 4 in. beam with a depth of 37 ft. 4 in. She will be a triple screw, with the combination of reciprocating and turbine engines which is now so much in vogue with her builders. Her accommodation will be altogether for about 3,000 passengers.

Safety at Sea.

An interesting return has just been published by the Board of Trade from which is seen the result of the various measures which have been taken to safeguard life and property at sea. During the year ending 30th June, 1911, casualities to 8507 vessels, aggregating 6,796,029 tons were reported. These figures compare with a total of 9715 vessels in the previous year. Some 4,432 lives were also reported as being lost. This figure is a trifle larger than the total for the year ending 30th June, 1910, but one big disaster would account for this. When we come to regard the number of total losses we find that there have been :—

			Average of twenty years.	
Number, 1910-11.		Tonnage.	Number.	Tonnage.
Sail	172	34,973	276	58,094
Steam ..	116	102,687	120	97,279
Total ..	288	137,100	7,914	3,107,468

But of course it must be remembered that the number of sailing vessels is a diminishing quantity.

The loss of life by sea casualties to British vessels has been :—

1910-11 .. 971 1909-10 .. 1128 1908-9 .. 1428

A highly satisfactory diminution. But the number of British vessels missing seems to tend upwards, the figures being :—

1910-11 .. 29 1909-10 .. 21 1908-9 .. 17

The Seafarer as Author.

I hear that another retired master mariner is about to edify the world by the publication of his memoirs. I suppose there must be some market for these reminiscences since the supply continues so steadily. But it would seem that a book by an engineer would be not only a novelty, but also probably be far more interesting to the general public, for the engineer's work is fully as noteworthy as that of the navigator, whilst as a rule the standard of education and of intelligence is higher in the engine-room than on the bridge.

The Hamburg-American Line

has just published its annual report. It deals with huge figures. Its capital is being increased to some seven and a half millions sterling, whilst its tonnage is now given at upwards of 1,200,000 tons gross register. Whether this total includes the three 50,000 ton liners (of which the *Imperator* is approaching the launching stage in the Vulcan Co.'s yard, the other two being deliverable in 1914 and 1915 respectively from Messrs. Blohn & Voss) is not quite clear. Anyhow, it is the biggest fleet the world has ever seen. The vessels accomplished a distance of 8,150,000 nautical miles in the year, which is equivalent to 377 times the circumference of the earth. The steamers shifted 7,250,000 tons of cargo, and an average of 1000 fresh passengers every day of the year, this figure excluding "bathing passengers" in the local seaside boats.

The Loss of the "Oceana."

Great sympathy will be felt with the P. & O. Company in the loss of its steamship *Oceana*, off Eastbourne. It is a remarkable thing that the *Prsagna*, the German sailing vessel with which she collided, should have come to grief in just the same spot where the other big Hamburger—the *Preussen*—was in collision with the Newhaven and Dieppe mail steamer a year ago. It is unfortunate too that the loss of the *Oceana* should have followed so soon on that of the *Delhi*, for the public are too apt to dwell on these quickly following disasters and to forget the many years in which the Company's vessels ply the shuttle of commerce without disaster, and even without delay. But there the accident is and no doubt enquiry will elicit the cause. Beyond expressing sympathy with the Company and those who have suffered bereavement and loss over the disaster it is as yet premature to speak much. It would appear that the *Oceana* remained afloat for say six hours after the collision. Had those aboard her remained by the ship till daylight, there is no doubt that with the assistance of the t.s.s. *Sussex* and the other vessels which came up, all loss of life might have been avoided. On the other hand the extent of the damage could not be ascertained with accuracy, there was always the danger of the bulkheads giving way—as, indeed, actually happened at the end—when the vessel would sink instantly, giving no time to lower the boats. So what was done was done for the best, and the underwriters must be thankful that the wreck lies in such comparatively shallow water that there is a strong probability that the three-quarters of a million which she carried in bullion will eventually be salved.

The Canadian-Pacific Railway

is about apparently to open up a new field by starting a service between the eastern ports of Canada and the West Indies. Anything which tends to bring these dependencies into closer touch will benefit the Empire as a whole as well as the traders most nearly affected, and it is greatly to be desired that due encouragement will be secured for the new venture. The Imperial Direct Line having lost its subsidy and having sold the great part of its fleet presents rather a sorry statement for the year 1911. It writes off £68,000 for capital loss on vessels sold, provides for debenture interest and depreciation of assets, and then shows a loss on the year's trading of £78,000. This brings the total debit balance of the Company up to £216,000. This statement should be strong argument in favour of State aid to any company serving Jamaica with a regular service of fast mail steamships, and should teach people generally that the running of a shipping company is something more than the mere declaration of fat dividends.

THE DREADNOUGHT CRUISER "QUEEN MARY."

THE battleship cruiser *Queen Mary* was successfully launched from the yard of Palmers' Shipbuilding and Iron Co., Jarrow-on-Tyne, on the 20th of March, the event being witnessed by a great concourse of people. On account of the vessel's great length, it was deemed advisable to remove the large gangway at the Howdon ferry landing on the opposite side of the river for fear the cruiser would not be turned sufficiently quickly to prevent her doing damage. A large and distinguished party took part in the launching ceremony, which was performed by Viscountess Allendale, and the Admiralty was represented by Capt. H. B. Pelly. The launch took place in splendid style and the vessel was quickly brought up by the check cables. Lord Furness, who presided over the subsequent proceedings, described the *Queen Mary* as the most powerful of battleship-cruisers afloat, and Capt. Pelly said that a projectile from one of the vessel's guns was equal to the *Victory's* whole broadside.

The *Queen Mary*, which is of the improved "Lion" class, exceeds that vessel in size, being in length 725 feet overall by 87 feet beam and having a displacement of 28,000 tons. Her Parsons turbine engines are of 80,000 h.p., and the vessel will have a speed of 28 knots, this is the largest warship so far built on the Tyne, and is a triumph for her builders. She was laid down on March 11th, 1911, and has therefore been one year reaching the launching stage.

THE INSTITUTION OF NAVAL ARCHITECTS.

THE Spring Meetings of the Fifty-third Session of the Institution of Naval Architects were opened in the hall of the Royal Society of Arts in John Street, Adelphi, on the 27th of March, and continued on the 28th and 29th of the month. The gathering was strongly representative of the science and industry of shipbuilding and marine engineering. The Marquis of Bristol, who occupied the chair, opened the proceedings by calling upon Mr. R. W. Dana, the Secretary of the Institution, to present the annual report.

Annual Report of the Council.

The Council have pleasure in congratulating the members upon the completion of a memorable year in the history of the Institution. The keen appreciation of their reception during the Jubilee meetings which has been shown by the foreign delegates and representatives moves the Council to refer once more to the kindness and hospitality of those who contributed so generously to the entertainments.

The roll of membership has been increased by many notable additions during the past year. The number of new candidates elected was the largest hitherto recorded in any one year, and the total membership, after allowing for deaths and resignations, is 1,916, as against 1,984, 1,895 and 1,842 respectively in the three preceding years.

Since the last annual report the Council have elected as honorary vice-presidents Mr. F. L. Devitt, chairman of Lloyd's Register Society; Mr. Francis Henderson, chairman of the British Corporation; Professor V. B. Lewes, who has served upwards of twenty years on the Council of the Institution; and Mr. Charles Ellis, honorary treasurer.

The Council have had under consideration the question of the election of members and associate members. While they do not consider it desirable to introduce any change in the qualifications required of candidates, which would involve a re-drafting of the existing rules, yet they believe that some raising of the standard of professional membership would be both beneficial to the Institution as a body, and would meet with the general approval of its members.

The formal opening of the William Froude National Tank during the Jubilee meetings week marked the completion of a noteworthy addition to the scientific resources of the nation. Mr. A. F. Yarrow's generous gift has now placed at the disposal of shipbuilders and owners and others interested in the improvements of ships one of the largest and best equipped experimental tanks in the world. The working of the establishment is proceeding satisfactorily, and some interesting experiments and investigations have already been made there.

A valuable addition has quite recently been made to the scholarships administered by the Council of the Institution. The Royal Commissioners for the Exhibition of 1851 have offered to award annually a post-graduate scholarship in naval architecture of the value of £200 per annum, tenable for two years. The first award was made at the commencement of the present year to Mr. Arthur Cannon, of Glasgow University, Associate member of the Institution. Mr. Cannon, who had obtained a first-class professional certificate in 1909 at the Royal Naval College, Greenwich, was nominated for the appointment both by the Lords Commissioners of the Admiralty and by the governing body of Glasgow University. He will now enter upon a course of research work at Glasgow University in problems connected with the rolling of ships and other subjects of interest to the profession. The award of the Martell Scholarship for 1911 was made to Mr. A. P. Cole, of Portsmouth Dockyard, who is now following the course in naval architecture at the Royal Naval College, Greenwich. The Council desire to call attention to the small number of entries which have, during recent years, been received for these scholarships.

The following gentlemen have been selected to represent the Institution on the Technical Committee of Lloyd's Register for the ensuing two years—Messrs. C. E. Allen, Thomas Bell, G. B. Hunter, and John Inglis—while the Institution's two representatives on the Board of Trade Merchant Shipping Advisory Committee (Sir Theodore Doxford and Dr. John Inglis) were re-elected for a further period of service. The vacancy on the Consultative Committee to the Board of Trade created by the death of Mr. D. J. Dunlop was filled by the election of Mr. J. McKechnie. Mr. Bruce Ismay was re-elected as the Institution's representative on the Court of the University of Liverpool.

The Council note with satisfaction the action of Lloyd's Register Society in adding to their General Committee of Management ten representatives of shipbuilding and marine engineering. Of these, nine are members of the Institution, *viz.*, Messrs. Thomas Bell, James Denny, Harold R. Dixon, Henry M. Grayson, Alexander Gracie, M.V.O., George B. Hunter, D.Sc., Andrew Laing, James Lithgow, and James Readhead.

Several notable functions took place abroad during the past year, at which the Institution was represented, *viz.*, the special commemorative meeting in Rome last November of the Italian Society of Naval Architects; the Jubilee meetings of the Swedish Society of Civil Engineers at Stockholm; and the unveiling of a monument to the late M. Augustin Normand in Havre.

The losses sustained by the Institution during the past year have happily been less numerous than usual. They include, however, several very distinguished members; among these are Admiral Sir John Dalrymple Hay, Bart., G.C.B., etc., honorary vice-president, whose association with the Institution dated from its foundation; Mr. David Dunlop, of Whiteinch, vice-president; Mr. John Ward, of Dumbarton, member of Council; Rear-Admiral Melville, U.S.N., L.L.D., D.C.L.; Monsieur E. Widmann, technical director of the Forges et Chantiers de la Méditerranée; and Monsieur Delaunay-Belleville, head of the well-known firm of that name.

The Council note with great satisfaction that the Fritz Medal for the past year, which is conferred on the recommendation of the principal engineering societies of the United States, was awarded to Sir William White, honorary vice-president of the Institution, in recognition of his services to naval architecture.

The annual gold medal of the Institution for the past year has been awarded to Professor E. G. Coker for his paper on the "Determination of Stresses by the Photo-elastic Method," and premiums have been awarded to Mr. C. E. Inglis, M.A., and Mr. J. Montgomerie, B.Sc., for their respective papers read at the last spring meetings.

A gold medal of the Institution has also been awarded to the Secretary, in recognition of his services in organizing the Jubilee meetings.

The Scrutineers announced that the ballot for officers had resulted as follows. Vice-President—Dr. S. J. P. Thearle. Members of Council:—Mr. James Bain, Mr. R. R. Bevis, Mr. James Brown, Sir Benjamin Browne, Mr. D. B. Morison, Mr. J. E. Thornycroft, Col. R. Saxton White, Sir James Williamson, Mr. Andrew Laing and Mr. A. W. Simpson. Associate Members of Council—Mr. A. A. Booth, the Marquis of Graham and Sir Thomas Sutherland.

Presidential Address.

The Marquis of Bristol opened his presidential address with a tribute to the memory of the late Admiral Sir John Dalrymple-Hay. Referring to shipbuilding, His Lordship said that the industry had made a forward move, and the output of ships in the United Kingdom for 1911 had surpassed all records. It was true that in 1907, the previous highest on record, the output of merchant vessels was slightly higher than during the past year, but if the construction of warships was taken into account the balance remained in favour of 1911. The total output of 2,114,[illegible] tons represented an increase of 58 per cent. in merchant ships and 71 per cent. in warships. In the construction of warships, whereas the tonnage launched in the United Kingdom increased during the past year from 134,[illegible] to [illegible], the tonnage launched abroad during the same period had risen from 176,200 to 5[illegible] tons, a very significant feature as showing the large increases taking place at the present time in the navies of other Powers. Great improvements had been made during the past year in methods of ship construction and equipment. The steam turbine had arrived upon a new stage in its development by the successful adaptation of gearing to the transmission of its power, and successive improvements in oil-engine design had overcome the principal obstacles which presented themselves to its use for ship propulsion. A vast new field of usefulness was thus opened up for the internal

combustion engine. The application of this engine to warship use opened up great possibilities. Tactical and strategic questions of the greatest moment were involved in its use and it was possible to look forward in the near future to changes in warship design quite as remarkable as those witnessed during recent eventful years.

The annual dinner of the Institution was held on the 27th of March in the Connaught Rooms, and the Marquis of Bristol presided over a very large and distinguished company. After the toast of "His Majesty's Navy," Sir Samuel Evans responded to the toast of "His Majesty's Judges," proposed by Lord Aberconway. The Marquis of Graham, on proposing the toast of "The Mercantile Marine," said that the coal strike had caused them to look for another source of power besides coal. Their attention had been turned to oil as a source of power for ship propulsion, and the possibilities of the oil engined ship had been brought home to them by the recent visit of the *Selandia* to the Thames.

Sir Edward Beauchamp, M.P., in responding, said that half a century ago this country was not only the trade centre of the world, but chief carrier of the world's produce, but at the present time we had many competitors. Though foreign mercantile fleets had grown up, our own had enormously increased. Of 464 large ocean-going steamers of 7,000 tons and upwards, this country possessed 285. The estimated carrying capacity of the fleets of the world was 67,000,000 tons of which we possessed 60 per cent. Mr. Archibald Denny proposed "Our Guests," on whose behalf Sir Archibald Geikie replied, and Colonel R. Saxton White proposed "The President," to which the Marquis of Bristol suitably responded.

The papers read and discussed at the meetings were as follows:—(1) "Some military principles which bear on warship design," by Admiral Sir Reginald Custance, K.C.B., etc.; (2) "On turning circles," by Professor W. Hovgaard; (3) "The law of comparison for surface friction and eddy making resistances in fluids," by Mr. T. E. Stanton; (4) "Description of the William Froude National Tank (Part II.)," by Mr. G. S. Baker; (5) "Results of trials of the Diesel engined sea going vessel *Selandia*," by Mr. W. I. Knudson; (6) "Gas power for ship propulsion," by Mr. A. C. Holzapfel; (7) "The effect of bilge keels on the rolling of lightships," by Mr. George Idle and Mr. G. S. Baker; (8) "Results of calculations regarding the effect of an internal free fluid upon the initial stability and the stability at large angles in ships of various forms," by Mr. A. Cannon; (9) "On the Solignac-Grille boiler and its application in French Channel steamers," by Mons. G. Hart; (10) "Results of experiments on water-tube boilers with special reference to super-heating," by Mr. H. E. Yarrow; (11) "Geared turbine channel steamers *Normannia* and *Hantonia*," by Professor Biles; (12) "Performance on service of the channel steamer *Newhaven*," by Mons. P. Sigaudy; (13) "On the measurement and automatic recording of dead reckoning," by Mr. F. R. S. Bircham: (14) "Description of a tide indicator," by Comm. Baugh, R.I.M.; (15) "The arrangement of boat installations on modern ships," by Mr. A. Welin; (16) "Torsional vibrations of elastic shafts of any cross section and mass distribution, and their application to the vibration of ships," by Dr. L. Gumbel; (17) "Load extension diagrams obtained photographically with an automatic self-contained optical load extension indicator," by Professor W. E. Dalby.

Owing to the preat pressure on our space we are not able to deal with all the papers in this issue, but the reader will find in another part of the journal, illustrated and full reports of papers numbers 5, 10 and 11, number 5 being Mr. Knudson's paper on the Diesel-engined vessel *Selandia*. Much of the subject matter of a few of the other papers has been dealt with in articles which have previously appeared in "The Marine Engineer and Naval Architect." In a future issue we hope to publish reports of those papers which we are compelled to omit from this number.

Internal Combustion Marine Motors.—Owing to the extreme pressure on our space this month we are compelled to hold over the continuation of this article until the May issue.

The 1st of April will witness the introduction of a very interesting discussion, to be held at the North-East Coast Institution of Engineers and Shipbuilders on the "Relative possibilities of the Diesel oil engine, geared turbine and suction gas engine as compared with the reciprocating engine for marine propulsion."

MARINE BOILER EXPLOSIONS.

From the Board of Trade Reports.

Report No. 2097 deals with the explosion from a boiler on board the steam drifter *Rubicon*. The explosion occurred on the 14th October last, when the vessel was about 5 miles west of the Lemon and Ower lightship, and about 30 miles from Great Yarmouth. No person was injured by the explosion. The boiler is of the ordinary single-ended marine type, and is made of steel, with the exception of the smoke tubes, which are of iron. A hole, about $\frac{7}{16} \times \frac{5}{16}$ in., and of irregular shape, was formed in one of the smoke box tubes. Through this opening the contents of the boiler escaped into the stokehold. The explosion was due to corrosion on the water side of the tube, in consequence of which the tube became so thin that it could no longer withstand the ordinary working pressure. The observations of the Engineer Surveyor in Chief are as follows:—In this case, one of the plain tubes in the boiler of a steam drifter, having become wasted by corrosion, burst under ordinary working conditions. The explosion, although of an insignificant character, resulted in the disablement of the vessel, and it is fortunate that it occurred in favourable circumstances.

Report No. 2100 deals with the explosion from a boiler on board the steam fishing vessel *Viola*. The explosion occurred on 4th August last, when the vessel was proceeding down the Humber. Fred Hackford, a coal trimmer, was slightly scalded on the right foot. The boiler is of the ordinary single-ended marine type, and is made of steel. A piece, about 3 in. in length, of the flat asbestos ring forming the joint of the front lower manhole door was forced out of position, allowing the contents of the boiler to escape into the stokehold. The steam pressure at the time was about 170 lbs. per square inch. The explosion appears to have been caused by the nuts on the studs holding the door in position not having been sufficiently tightened up to properly compress the jointing material after the lower part of the boiler became fully heated. The observations of the Engineer Surveyor-in-Chief are as follows:—A portion of the joint of the lower manhole door was blown out, and the boiler was emptied through the opening thus formed. Although the surfaces of the door and the flange were not so good a fit as they might have been, it is thought that this was not the chief cause of the explosion, but rather that the joint was not sufficiently tightened as the bottom of the boiler heated up under the rising steam pressure.

Report No. 2101 deals with the explosion from a boiler on board the steam drifter *Treasure Trove*. The explosion occurred on the 22nd September last, when the vessel was about 21 miles N.E. ½ E. from Spurn Lightship, on the east coast of England. No person was injured by the explosion. The boiler is made of steel, and is of the ordinary single-ended marine type, with two plain furnaces and separate combustion chambers. A hole, which is stated to have been about 1¼ in. in diameter, was formed in one of the smoke tubes on the port side of the boiler. Through this opening the steam and water escaped into the engine-room with considerable violence. The explosion appears to have been due to local corrosion of the tube on the water side, in consequence of which it became so thin as to be no longer able to withstand the ordinary working pressure. The observations of the Engineer Surveyor-in-Chief are as follows:—This boiler was about three years old, and, in this short time, corrosion on the water side of the tubes had been so rapid that several of them had to be renewed after the explosion of this one, which was caused by local thinning. With proper care, the life of boiler tubes should be much longer than this. As a result of this explosion the vessel was disabled and towed into port.

Beldam's "Excelsior" Metallic Packing Rings (Duplex Type), manufactured by The Beldam Packing and Rubber Co., of 93 and 94, Gracechurch Street, London, E.C., are fitted to all the rods and valve spindles of the White Star triple-screw steamer *Titanic*, which sails on her first voyage from Southampton to New York on Wednesday, April 10th, 1912. The Company are also patentees and manufacturers of many other well-known engineering specialities.

BOILER TROUBLES AND THEIR PREVENTION.

SCIENTIFIC investigation extending over many years has definitely proved that the only reliable preventative of corrosion and incrustation of boiler plates is the addition to boiler water in proper quantities of calcined soda, otherwise dehydrated carbonate of soda. It is, however, comparatively useless unless the exact quantity required be added.

Experience has shown that the so-called purification of boiler water with the costly apparata generally used gives only incomplete and unreliable results, and that it is far better to treat the water direct with the proper quantity of calcined soda. This proper quantity has, however, only been determinable by chemical analysis of the water to be used, and only in rare instances is a trained chemist available in the boiler house to undertake a tedious and exhaustive analysis of this kind.

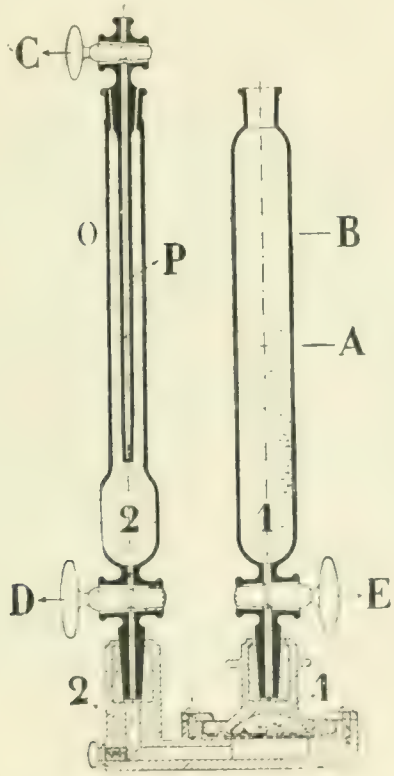


FIG. 1.

This difficulty is claimed to have been removed by the use of Erfmann's Boiler Water Controller, an invention which is already largely in use by steam users on the Continent. It is stated that any boiler attendant can without any chemical knowledge what ever, determine in a few minutes the exact quantity of soda ash required for the entire elimination of incrustation and corrosion of the boiler plates. The addition of the correct quantity of soda ash being ensured, priming and frothing are prevented; and as the "Controller" described later indicates neither more nor less, but the exact quantity actually necessary to completely decompose the harmful and destructive substances in the boiler water, all troubles attendant upon the use of too large a quantity of soda are therefore entirely done away with.

It will be seen from the illustrations Figs. 1 and 2 that the "Controller" consists of two graduated glass tubes 1 and 2, an aluminium base with dovetail catches, and a pipette P., fitted with a cock. There are also three drop bottles and a box containing specially prepared filter papers; the whole being arranged in a well-made cabinet so as to be easily used anywhere. Full directions for using the apparatus are arranged on the inside of the lid in sight of the operator, so that he has always complete instructions before him. The front of the case is hinged, and serves as a bench for the "Controller," which is attached to it in such a manner as to be readily and easily removed for cleaning, while the tubes, pipette, bottles, etc., all fit into separate compartments provided for them, making the whole compact and handy for carrying or stowing away when not in use. The drop-bottle No. 1 contains an orange-coloured liquid, the second a colourless liquid, and the third is provided to contain the sample of water to be tested. Having described the apparatus we will now show how the correct quantity of soda ash to be added to the boiler is determined :—

First, a filter paper is placed on the perforated disc, the filter paper being waxed along the edge, so as to provide a water-tight joint. The graduated tube 1 is

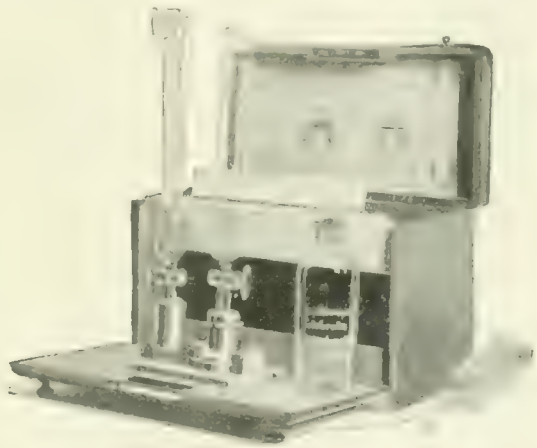


FIG. 2.

placed in the socket 1, and the cock E is closed. Hot boiler water is then poured in up to the mark A, and some of the orange-coloured liquid is added until the total liquid reaches the mark B. Then the tube is closed at the mouth with the thumb and shaken so as to thoroughly mix the liquids, and is replaced in the hole 1. The *hot* boiler water must be taken from the boiler when under steam. When filling the tube 1 care must be taken that the centre of the concave surface of the liquid is level with marks A and B respectively

The tube 2 having the pipette P is now placed in the hole 2 of the aluminium base, and after an interval of five to ten minutes to allow chemical reaction to take place, the cocks C and D are opened first, and then the cock E only far enough to allow the liquid in the tube 1 to sink very slowly on to the filter paper to prevent tearing. It will be seen that the tubes 1 and 2 are now in connection with each other, and the

turbid liquid in the tube 1 percolates slowly through the filter paper, which retains the precipitates and rises as a clear orange-coloured liquid in the tube 2.

Now in the tube 2, a definite quantity only of this liquid is required, and to ascertain this exact quantity, the operator would require a great deal of practice and even then would be leaving a great deal to chance. This quantity is, however, automatically fixed by the apparatus itself. For this purpose, the pipette is brought into use. The liquid seeking its level in the tubes when allowed to flow from the tube 1, can only rise in the tube 2 to the bottom of the pipette, by reason of the pipette fitting air-tight in the tube 2, but it rises in the pipette when the cock of the same is opened to about the same level as in tube 1. It is unnecessary to watch the apparatus, during the filtering of the liquid, as the action is entirely automatic.

As soon as the liquid rises in the pipette (the actual height to which it rises is immaterial), all cocks must be closed, and the pipette is removed with the liquid it contains, which latter can be thrown away. The required definite quantity of liquid now remains in the tube 2, and to it is added drop by drop and with repeated shaking, the colourless liquid until the orange colour of the liquid changes into pink and the change of colour is found to be permanent on shaking. Colour blindness will prove no hindrance to these observations, as it is not so much the colour which has to be observed, as the actual change of colour, which takes place. This is easily discernible on comparison with the liquid in tube 1. Of course this must only be undertaken in daylight, as it is difficult to distinguish the change of colour by artificial light.

The level of the liquid must now be observed, if it be below the zero point, as many hectograms of soda ash as there are dimensions registered below the zero point, must be added daily to the water for each ton of boiler capacity, while if it be above zero point, an excess of soda is indicated, and as many hectograms less per ton boiler capacity must be added, than were added the day before.

The liquid standing at zero shows the daily additions of Soda to have been correct. As the quantity of deleterious matter in water varies considerably according to the source from which it is obtained it stands to reason that the zero point cannot be given a fixed position on the scale, but must be ascertained and marked in pencil on the frosted part of the tube 2, which is done in the following manner:—The procedure is similar to that which has already been explained, with the following important exceptions:—A small hole as big as a pea must be made in the filter paper and no warm water is used, but cold feed water. All the cocks can be opened at once, without any previous waiting.

These differences ensure as little reaction as possible taking place, between the orange liquid and the feed water. Also, the liquid must not be filtered when allowed to flow from tube 1 to tube 2. A filter paper is therefore not really necessary, but as it serves as a packing to make a water-tight joint, it is used, but pierced with a hole.

On the change of colour taking place as before described, the centre of the concave surface of the liquid will indicate the level of zero point, for the feed-water tested, and is marked by a pencil line. This zero point may be used, so long as the same feed water is used, but to be on the safe side, it is advisable to test for the zero point from time to time (say once a month), as there is always a possibility of a slight change taking place in the feed water.

After each test, whether A or B, the apparatus must be thoroughly rinsed out with clean water, any discoloration still remaining being easily removed by the use of a few drops of the colourless liquid. The bottles however, must only be rinsed out with the liquids, they are to contain.

The following example will perhaps enable the reader to better understand how the controller is adapted to actual use:

Let us suppose that the water of a boiler, having a capacity of 5 tons, is to be tested. Having been tested with the controller, the water is found to require 5 hectograms of soda ash per ton, that is to say, it will be necessary to at once add 5 × 5 hectograms = 25 hectograms = 4lbs. 8oz. soda ash.*

The following day, the water is again tested and it is found that 2 hectograms per ton are required, in that 5 × 2 hectograms = 10 hectograms 4lbs. 6½oz. have at once to be added, and during the remainder of the day, a further 4lbs 6½oz. must be added by degrees to counteract the impurities fed into the boiler during the day by the feed pump.

If on the following day, the controller indicates zero, it means that the daily quantity of soda to be added to the water must be 4lbs 6½ozs. It will now only be necessary to test the water twice a week, to ascertain whether the quantity of soda ash has to be slightly increased or decreased.

Amongst the many advantages claimed for "Erfmann's Boiler Water Controller" are the following:—

The saving of fuel, the abolition of the expensive and destructive process of removing scale by mechanical means, the entire absence of trouble through any oils or fats which may be present in the water, the absence of corrosion of the boiler plates and boiler fittings, the avoidance of boiler stoppages and the necessity for a reserve boiler, and longer steaming capabilities of the boiler.

It would appear that there is some considerable ground for such a claim, since, among the many who, after testing the advantages of the "Controller," now have it in constant use, can be numbered the following:—The Holland-America Line; the Rotterdamsche Lloyd; the Nederlandsche Lloyd; and the Royal Dutch Navy. The Erfmann Boiler Water Controller Company, of 88, Fenchurch Street, London, E.C., are the sole concessionaires of the "Controller" for Great Britain and the British Colonies.

The Trade of Hull and the Humber Ports is the name of an annual review published by *The Eastern Morning News*, of Hull. The book is a statistical record and review of the year 1911, and contains complete and comprehensive reports of the past year's trading at Hull, Grimsby, Goole and the manufacturing district around. Special features are the statistical tables showing the shipping tonnage, imports and exports for 1911 and the preceding ten years, freight fixtures, Humber shipbuilding output, local railway and dock schemes and facilities. Published at the price of one penny for 124 pages, this annual, owing to our anomalous post office regulations, costs 2½d. to send through the post.

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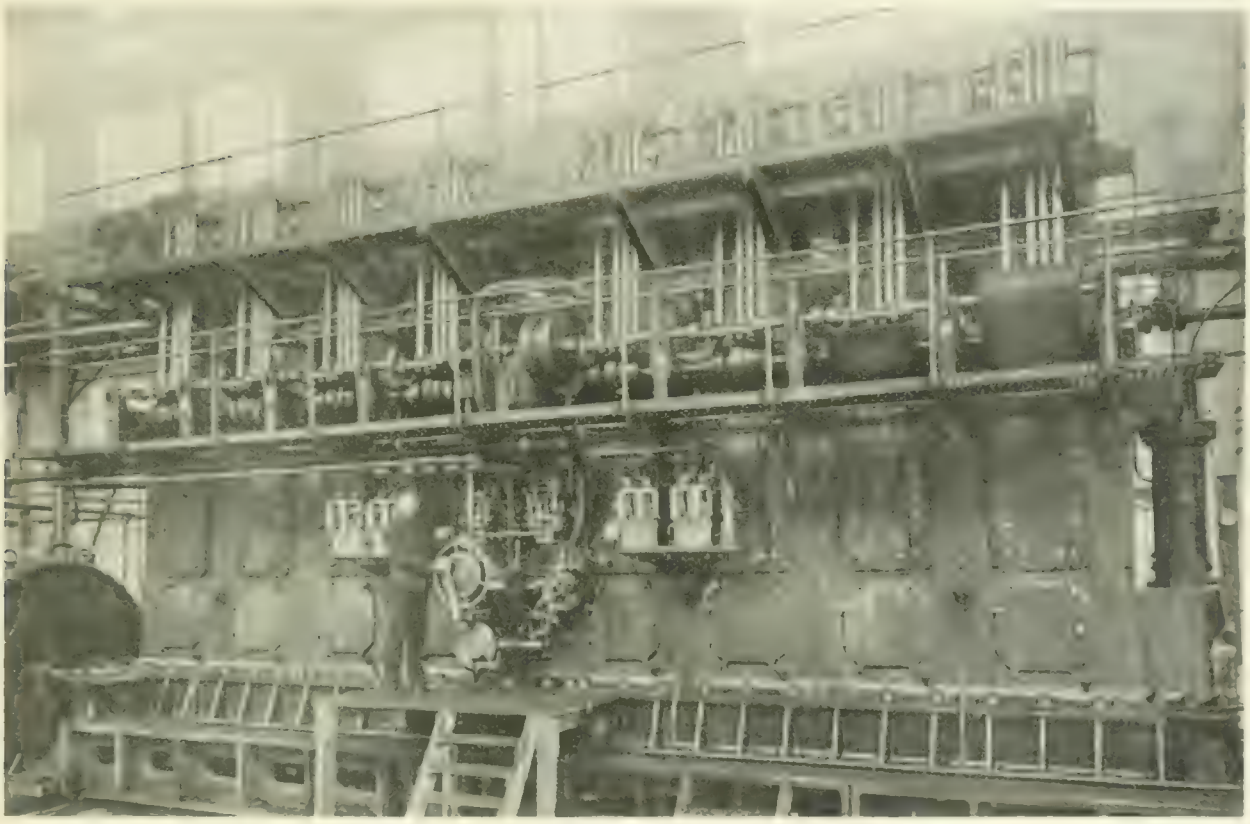
*For use in Great Britain, a printed table of conversion of hectograms into ounces avoirdupois is supplied with the apparatus.

Martineau hydraulic electric system), and seems to work well in every respect. As will appear from the description given, everything is electric, with the exception of the little donkey boiler, which is chiefly intended for the heating of the vessel. Oil fuel is used in this boiler.

The fuel oil is stored in the double bottom of the vessel, and the total provision of oil on board is sufficient for a continuous distance of about 30,000 English miles. After having made three short trial trips in the Sound, the *Selandia* last left Copenhagen on February 22nd, bound for Aalborg, where about 2,000 tons of cement were loaded, and from there the voyage was continued to London.

horse-power developed by the main engines for the actual propelling of the vessel, but also the consumption of all the fuel oil used by the auxiliary motors. From this it may be seen that the above-named 0·165 kgr. fuel oil × the 2,500 I.H.P. (which is the normal horse-power of the vessel) gives the total consumption of fuel oil on board, excluding only that used for the heating of the cabins.

The arrival at the West India Docks, where the vessel stayed during her visit in London, took place on February 27th, and here there was ample opportunity to try the manœuvring capacity of the motors, the working of which, however, was satisfactory in every way.



One of the 1250 H.P. eight cylinder four cycle Engines of the *Selandia*

This first trip across the North Sea aroused great interest, as it was the first real practical trial of the seaworthiness and manœuvring capacity of the motors. Throughout the voyage the machinery worked excellently, and the plant was tried both in a smooth sea at high speed, and also in a heavy fog at slow speed, and in strong winds with rather a heavy sea, but nothing seemed to influence the vessel adversely, and she stood the test perfectly under these various conditions.

Records were taken of the consumption of fuel oil, and it was found that 0·165 kg. (0·363 lb.) of oil per indicated horse-power hour were consumed, it being understood that this includes not only the indicated

The *Selandia* is constructed as an awning deck ship and has a carrying capacity of about 7,400 D.W., and the calculated speed is about 12 knots. She is intended mostly for cargo and will carry a limited number of passengers only. The midship structure is entirely devoted to their accommodation, which has been carried out in an excellent style, to the designs of Mr. Brumner and according to ideas based upon the experience of the East Asiatic Company. The cabins are large and bright, and to each pair is attached a bath-room, to which direct access may be had. These cabins are each fitted with a sofa bed, large washstand, writing table and chairs. The saloons are lofty and rise several feet above the promenade deck. On the

same deck, to which access is obtained from the dining saloon by means of a wide staircase, is a structure containing an elegant smoking saloon and combined sleeping and sitting cabins; the Captain's cabin and the chart room are also on this deck. An extra smoking saloon is provided exclusively for the ship's officers. Wireless telegraph instruments are installed on board.

The Dining Saloon.

The *Selandia* is one of three sister vessels ordered by The East Asiatic Company, Ltd., for their trade with the Far East. Her sister ship, *Fionia*, is now building at Copenhagen by Messrs. Burmeister & Wain, and the third, *Jutlandia*, is in the hands of Messrs. Barclay, Curle & Co., Ltd., on the Clyde.

INSTITUTE OF MARINE ENGINEERS.

THE annual meeting of the Institute of Marine Engineers was held on March 15th in the Abercorn Rooms, Liverpool Street Hotel, E.C., the Most Hon. the Marquis of Graham (President) occupying the chair.

The annual report was read by Mr. Jas. Adamson (hon. secretary). It showed a membership of 1,284 at the end of the session, an increase of 56 on the previous session. Ten papers had been read and discussed at the ordinary meetings of the Institute, and the transactions issued each month to the members. The Denny Gold Medal for the best paper read during session 1910-11 had been awarded to Mr. W. R. Cummins (member) for his paper on "The Internal Combustion Engine for Marine Use," and awards had also been made to Messrs. J. D. Boyle and H. B. Locke (graduates) for essays on the subject of "The Steam Engine Indicator." The total amount subscribed to the city premises fund, including promises, was £4,557. Reports of the various departments of the Institute's work were also submitted.

Mr. J. Clark (member) submitted the balance sheet and revenue account, in the unavoidable absence of the hon. treasurer, Mr. Alex. H. Mather. The credit balance of revenue account was £159 0s. 4d., as compared with £70 the previous session, and the total assets amounted to £4,178 6s. 1d. Entrance fees showed a rise of £21 10s. over last session. The amount uninvested was about £800, and this matter would receive the attention of the Council in the near future. Suitable provision had not yet been made for the market depreciation of Consols, which stood at 85 in the Institute books, and were now quoted at about 78. At the present value the loss would be about £60. As an hon. auditor of the Institute Mr. Clark congratulated the Council on the most satisfactory position of the Institute financially.

In proposing the adoption of the reports, Mr. Alex. Boyle (vice-president) said he noted with pleasure the increasing amount spent upon the transactions of the Institute. For several years past the Institute had been increasing in membership, but, considering the large number of marine engineers, he did not see why the Institute should not have a membership of 5,000. He held that the value of the papers distributed to the members was alone equivalent to the amount expended by them; but there were many indirect advantages derived. By joining the Institute engineers would benefit the profession as a whole.

Mr. G. W. Newall (member) seconded the motion, which was carried unanimously.

A vote of thanks was accorded to the office-bearers and members of Council on the proposal of Mr. G. P. Lee (member), seconded by Mr. W. P. Durtnall (member).

Mr. Jas. Adamson (hon. secretary) responded, and in the course of his remarks said that, although the Institute had been developed more particularly on the scientific side, the founders had made provision in the Articles of Association for the club element, and he hoped this side of the Institute's work would be more developed in the future.

In replying to the vote of thanks to the retiring president, accorded on the motion of Mr. W. T. Seaton, seconded by Mr. A. E. Battle,

The Most Hon. the Marquis of Graham commented on the amount received in connection with the City Premises Fund, and said it was very gratifying to know that Lloyd's Register of Shipping had responded so generously as to give a donation of 500 guineas. His lordship commented on the benefit of the papers read at the Institute to the profession as a whole, and the value of the various activities of the Institute.

Votes of thanks were accorded to Messrs. J. Clark and A. Robertson (hon. auditors) and William Archer (hon. solicitor), these gentlemen being unanimously re-appointed.

The scrutineers (Messrs. E. W. Ross and P. Smith, R.N.R.) reported the result of the ballot for office-bearers and Members of Council for session 1912-1913 as follows: President, Mr. Summers Hunter; Hon. Secretary, Mr. James Adamson; Hon. Treasurer, Mr. Alex. H. Mather. Members of Council: Messrs. John Clark, John Falcon, John Gravell, John McLaren and James Peacock. The other Members of Council who did not retire in rotation are Messrs. Joseph Blackett, K. C. Bales, P. T. Campbell, W. E. Farendon, Joseph Hallett, W. Veysey Lang, J. T. Milton, H. Ruck-Keene, J. H. Silley and F. M. Timpson.

Part of the evening was taken up with the consideration of recommendations and suggestions from several of the members present.

The meeting closed with a vote of thanks to the chairman, on the proposal of Mr. George Adams, seconded by Mr. E. W. Ross.

Views of the Engine Room of the [illegible]

WATER-TUBE BOILER EXPERIMENTS, WITH SPECIAL REFERENCE TO SUPERHEATING.

OUR firm having recently tried some important experiments with a water tube boiler, it was thought that the results would be of interest to the Institution, and I therefore venture to bring them before this meeting. Being convinced that superheating is one of the directions in which advances in marine engineering will be made we constructed a water tube boiler which was fitted with a special form of superheater.

The objections which have hitherto been raised to superheating for marine work are: (1) Owing to the dryness of the steam oil for the internal lubrication in reciprocating engines becomes a necessity, and the oil, finding its way into the boiler, leads to trouble. (2) The probability of burning the superheater when the passage of the steam through it is suddenly reduced or stopped. By the introduction of turbines the difficulty of lubrication does not occur, and with regard to burning the superheater tubes, the arrangement we adopt avoids this risk.

The boiler with which these tests were made was of the Yarrow type, and was fitted up in our experimental shop, which is equipped with the necessary plant for making very complete tests. Throughout the experiments oil fuel only was used, and as it is possible with oil to maintain steady and uniform working conditions, very accurate results were obtained, which would not have been possible with coal, in which case irregularity of stoking and other sources of discrepancy occur. During the experiments careful records were taken of the oil consumed, the water evaporated, steam pressure, temperature of the superheated steam, and the temperature of the gases at various points during their passage past the boiler tubes.

As is well known, superheating is very largely adopted in land installations, and in locomotives it is being rapidly introduced. From information kindly given us by the locomotive superintendents of the main railway lines in this country, it appears that the economy realized in locomotives due to superheating averages fully 20 per cent. in fuel consumption, and rather more in water consumption. It may perhaps surprise many marine engineers to know that on the Great Western Railway alone no fewer than 500 locomotives are now running fitted with superheaters. Taking the average of several land turbine installations, there is found by superheating to 100° Fahr. to be a saving in consumption of fuel of from 8 to 10 per cent., and in steam consumption from 10 to 12 per cent. The reduction in steam consumption is specially important for marine work, as it enables a reduction to be made in the size and weight of the condensers, air pumps, circulating pumps, and feed pumps, and probably of the distilling plant. Independent of the gain directly due to superheating, the risk of water passing into the turbine from any cause whatever is reduced, and the fear of damage in consequence of water causing the stripping or cutting of the blades is diminished, and any additional cost of up-keep of the superheater will doubtless be fully balanced by the diminished risk of injury to the turbine blades by the action of water when using saturated steam.

Turning now to the design of the boiler and superheater with which the various experiments were carried out, I beg reference to Fig. 1, which shows a cross section of the boiler, and it will be seen that it consists of a top steam collector, as usual, and two lower water pockets. On the left-hand side the superheater is shown, and it will be observed that on this side of the boiler there are fewer rows of generator tubes than on the other side, where there is no superheater, it being thought desirable that the total heating surface and the resistance to the gases on both sides of the boiler should be approximately the same. The total heating surface of the boiler was 6,700 sq. ft., of which 1,265 sq. ft. consisted of superheating surface; the total heating surface on the superheater side of the boiler was 3,453 sq. ft., and on the other side 3,247 sq. ft.

The superheater consisted of a number of "U" tubes expanded into two longitudinal collectors, small doors being fitted so that access could be obtained to the tubes when required. The leading feature of the arrangement is that the superheater is placed on one side of the boiler only, and a damper is fitted in the up take on the same side, as shown on the diagram. If this damper is closed the whole of the gases are deflected towards the opposite side of the boiler, and no heated gases pass the superheater, the object being that if the main engines should be suddenly eased or stopped or when raising steam, the superheater may be shut off, so as to prevent the tubes being damaged, or the steam being superheated to an excessive extent, owing to there not being sufficient circulation of steam. In this way one objection to the introduction of superheating for marine installations is overcome.

A further advantage of this arrangement is that when the consumption of steam is suddenly reduced or stopped, not only does the damper prevent the superheater tubes from being burnt, but it also greatly diminishes the output of the boiler at the time when a reduced supply of steam is wanted, because only about one-half of the heating surface comes into contact with the hot gases. To avoid the possibility of the damper getting distorted through over-heating, it is provided with a hollow spindle, to which air is admitted and which passes thence between the two plates of the damper, escaping at the edge, and thus keeping the damper cool. This arrangement of damper has proved thoroughly successful under the most trying conditions.

In order to carefully measure the temperature of the superheated steam, and of the gases, a complete installation of thermometers and pyrometers was fitted to the boiler, and we have to thank the Director of the National Physical Laboratory, Dr. Glazebrook, and also Dr. Harker, for the assistance which they kindly afforded us in the selection of the most reliable instruments for this purpose.

Turning to Table A, giving particulars of one series of the trials with the damper open, it will be seen that the results are given for six rates of evaporation. It will be observed that at the maximum rate of evaporation, namely, when burning 1·237 lbs. of oil per square foot of heating surface per hour, the degree of superheat was 93° Fahrenheit. Corresponding figures are given at the lower rates of evaporation.

We now pass to similar trials with the damper closed, and on these the heating surface of the boiler is assumed to be that of the large nest of generator tubes only, as all the gases have to pass on that side of the boiler. The results of this series are shown on Table B.

As one of the objects of the marine engineer is to obtain more and more steam out of a given weight of boiler, we thought it would give useful information to make tests burning oil fuel at a rate of consumption considerably greater than has hitherto been the custom, to ascertain if the boiler would, under such conditions, show any defects. It will be seen from Table B that at the highest rates of evaporation nearly 2 lbs. of oil per square foot of heating surface per hour were being consumed, if we disregard the heating surface on the superheater side of the boiler. Thus, the surface on the opposite side of the superheater was subject to the heating effect of all the gases plus half the radiation. Every part of the boiler withstood the severe test, and trials burning this quantity of fuel were made on several occasions.

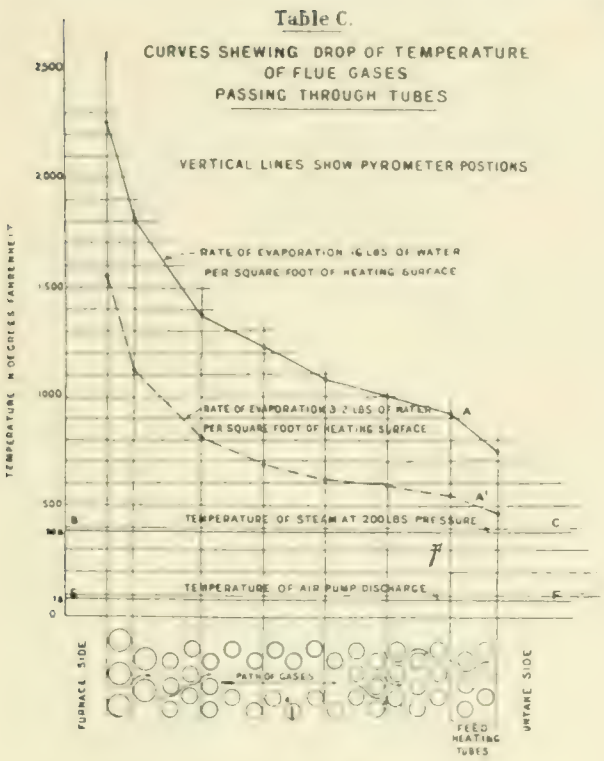
The results of other experiments indicate that in a properly designed boiler of the type we are dealing with, it is possible to burn, without injury to the boiler, 2 lbs. of oil per square foot of heating surface per hour.

Since these experiments were carried out the official trials have taken place with one of the destroyers built by us for the British Admiralty, H.M.S. *Archer*, in which boilers fitted with superheaters were provided. The result of these trials showed that the gain we expected was fully realized, and on the full speed trial the degree of superheat at the turbines was 94° Fahrenheit; the S.H.P. developed was slightly over 18,500, which compares with about 17,000, which is the S.H.P. we should have expected had the boilers been of the usual type. The mean speed obtained on the six runs on the measured mile at Skelmorlie was 30·9 knots, and the mean speed for eight hours, 30·3 knots, the contract speed being 28 knots.

One point to which Mr. Charles Merz (to whom I am greatly indebted for much valuable information) has drawn attention

* Read at the Spring Meetings of the Fifty-third Session of the Institution of Naval Architects, and contributed by H. E. Yarrow, Esq., Associate-Member.

Table C.



is the necessity, with the use of superheated steam of efficiently covering the high-pressure portions of the turbine cylinder with non-conducting material, because the metal on the inside of the cylinder in contact with the steam becomes hotter than that on the outside, especially at the edges of flanges and ribs. The inside tends to expand, and this expansion is resisted by the colder metal on the outside; consequently, if the temperature difference is great enough, the metal will be distorted, and perhaps strained beyond its elastic limit. For this reason the design of the ribs should be carefully considered, the thickness of metal throughout the structure being kept as uniform as possible.

These experiments were also the means of pointing out to us another important improvement in the Yarrow boiler, and Fig. 2 has been prepared, which illustrates the ordinary type of boiler without superheater, from which it will be seen that the last two rows of tubes farthest from the fire are partitioned off for the feed water to ascend. When working

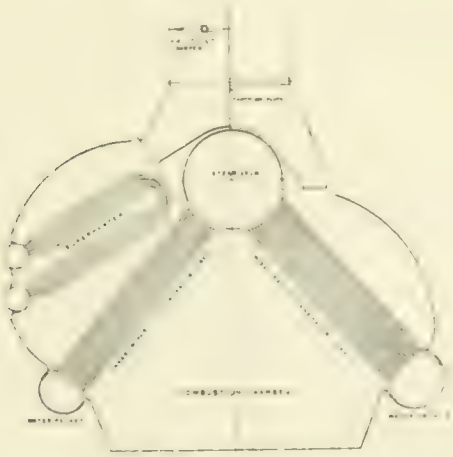


Fig. 1.

the boiler at high rate of evaporation we found that notwithstanding all possible precautions, even with turned rivets and carefully reamered holes we were unable to prevent the riveted beam of the water pockets from cooking. We found the pocket was sometimes hot and sometimes cool; indeed, in places sufficiently cool to be able to bear one's hand on it. These trials were frequently repeated with the same result, and we ultimately found out the cause. The fact was that the suction down the tubes which were in close proximity to the feed-heating tubes was so great that the cool feed water which had passed up the feed heating tubes was instantly drawn down into the water pocket without having had time to mix with the hotter water in the upper chamber, as indicated by the arrow in Fig. 2. This action took place intermittently and the water pocket locally changed their temperature, one portion of the water pocket being one minute hot and another minute comparatively cool, dependent upon the working of the feed pump. The strain thus thrown on the metal of the water pocket by this short-circuiting of the feed was evidently severe, and resulted in the leakage of the seams. Having discovered the cause of our trouble, it was not difficult to find a remedy. It was found that by simply placing a longitudinal partition plate in the upper chamber so as to avoid the short-circuiting of the feed, all difficulties disappeared. This plate is shown on the right-hand side of the diagram only, but in practice it would of course be fitted on both sides. The same trouble

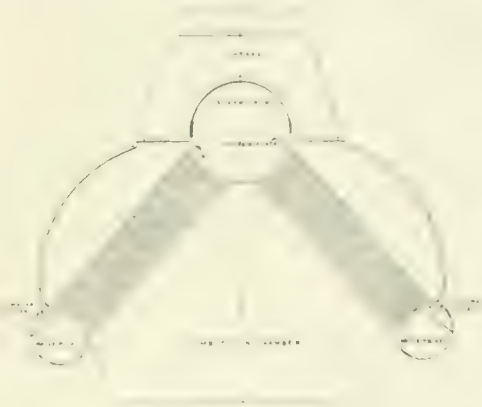


Fig. 2.

has before been met with, especially abroad, but the true cause was never suspected; it was generally put down to inferior workmanship. Even when no trouble is experienced, it is evident that serious and undesirable strains must at times be taking place which may be the cold load to the failure of the metal, due to constant fatigue. By the fitting of this partition plate, however, all such strains are eliminated.

Fig. 3 has been prepared to show the positions of the pyrometers.

Table C shows the temperature of the gases at various points in the boiler. The vertical lines correspond to the position of the pyrometers as shown in Fig. 3. The upper curve indicates the gas temperatures at a rate of evaporation of 16 lbs. of water per square foot of heating surface, and the lower curve represents the gas temperatures at a rate of evaporation of slightly over 3 lbs. per square foot of heating surface. The horizontal lines represent temperatures, and the line B C represents the temperature of the steam at 200 lbs. pressure, and the line E F the temperature of the air pump discharge taken at 75° Fahr.

It will be observed that a very great drop in temperature takes place during the passage of the gases through the first rows of tubes, showing the large proportion of heat that is taken out of the gases by these tubes. Also it will be observed that there is a sudden drop in the temperature at A and A' that is where the gases pass through the last rows of tubes. This is due to the fact that the cold feed water (which enters a portion of the water pocket) abstracts a greater amount of heat from the gases in ascending the two outside rows of tubes than would be the case if these tubes were full of water at the temperature of the steam.

Referring to Table C given in diagram form, it will be seen that the temperature of the gases at the point A^1, *i.e.*, just prior to the gases passing the feed heating tubes, is about 550° Fahr., and the temperature of the steam at 200 lbs. pressure is 388° Fahr. a difference of only 162°, whereas the temperature of the air pump discharge of 78° Fahr. gives a difference of 472°. This clearly shows the gain due to this system of feed heating and the desirability of extending it, which can be effected by having separate water collectors and feed heating tubes apart from the main water collectors and main generator tubes, *i.e.*, there would be two water collectors on each side of the boiler, the tubes connected to the top one acting as a feed heater, and such a design of boiler is shown in Fig. 4.

It should also be pointed out that there is a supplementary and an important advantage in this feed heating, namely, that any grease or sediment that comes over with the feed is deposited in these tubes, which are not subject to fierce heat, rather than in those nearer the fire, which are exposed to the intense radiation of the furnace, and thus the life of the boiler is prolonged. With the introduction of oil fuel some such arrangement is the more necessary, because it has been found that the oil heaters leak, with the result that oil mixes with the steam and passes ultimately into the boiler.

As I thought it would interest the meeting to indicate some of the arrangements for superheating and feed-heating which may be adopted with a view to still further improving the results in connection with such a boiler as the one we are dealing with, I beg your reference to three illustrations.

Fig. 5, it will be seen, shows the superheating tubes united to the steam drum, and to a steam receiver sufficiently large for a man to enter, the tubes being expanded at both ends. In this arrangement all the tubes are straight, a condition much appreciated by many authorities, and also there is an additional advantage by this system, as the superheating tubes on the one side of the boiler and the feed heating tubes on the other side of the boiler are of such a length that they can be withdrawn and replaced from inside the steam drum. Fig. 6 shows a set of U-shaped tubes placed between the generator tubes and the nest

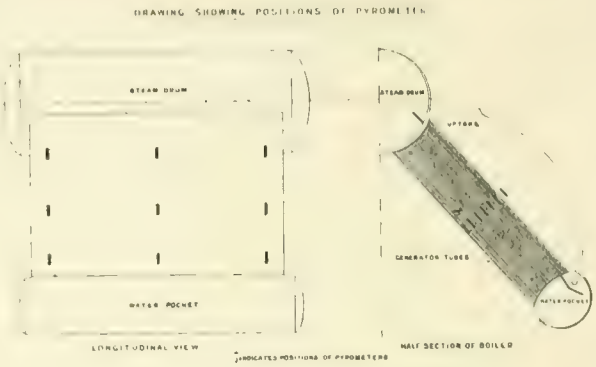


Fig. 3

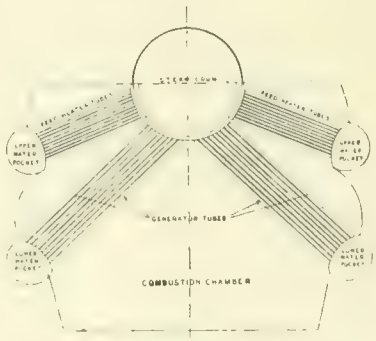


Fig. 4.

TABLE A.

Trials with Damper Open.

Heating Surface { Large Nest of Generator Tubes = 3,247 square feet; Small Nest of Generator Tubes = 2,188 square feet; Superheater = 1,265 square feet } 6,700 square feet total.

On these trials the heating surface is taken as the total heating surface of 6,700 square feet.

Steam Pressure lbs. per square inch.	Superheat in degrees Fahrenheit.	Air Pressure, inches of water	Lbs. of Water evaporated per hour.	Lbs. of Oil Fuel burnt per hour.	From and at 212 degrees Fahrenheit. Lbs. of Water Evaporated per lb. of oil per hour.	Lbs. of Water Evaporated per square foot of heating surface per hour.	Lbs. of Oil Fuel burnt per square foot of heating surface per hour.	Temperature of Feed Water, degrees Fahrenheit.	Temperature between Small Nest of Generator Tubes and Superheater, degrees Fahrenheit.	Temperature of Uptake, degrees Fahrenheit. Above Superheater.	Above Large Nest of Generator Tubes.
242	93·5	5·0	94,659	8,286	14·6	18·0	1·237	58·0	1,121	828	887
243	93·0	3·16	76,021	6,454	15·0	14·4	·9635	63·5	926	698	727
243·7	82·5	2·41	68,387	5,095	15·2	12·9	·850	63·5	903	685	688
242·8	61·1	1·7	46,041	3,630	15·9	8·6	·542	64·0	647	536	551
241·8	31·0	·968	20,059	1,540	16·1	3·7	·230	62·2	481	432	448
242·2	20·75	·625	8,478	·649	16·1	1·55	·096	63·5	465	409	416

TABLE B.

Trials with Damper Shut.

Heating surface { Large Nest of Generator Tubes = 3,247 square feet; Small Nest of Generator Tubes = 2,188 square feet; Superheater 1,265 square feet } 6,700 square feet total.

On these trials the heating surface of boiler is taken as heating surface of Large Nest of Generator Tubes = 3,247 square feet.

Steam Pressure, lbs. per square inch.	Air Pressure, inches of water.	Lbs. of Water evaporated per hour	Lbs. of Oil Fuel burnt per hour.	From and at 212 degrees Fahrenheit. Lbs. of Water Evaporated per lb. of oil per hour.	Lbs. of Water Evaporated per square foot of heating surface per hour.	Lbs. of Oil Fuel burnt per square foot of heating surface per hour.	Temperature of Feed Water, degrees Fahrenheit	Temperature of Uptakes, degrees Fahrenheit above Large Nest of Generator Tubes.
242·0	4·85	68,645	6,287	13·25	25·66	1·936	61·0	913
242·25	3·97	57,695	5,065	13·84	21·6	1·56	60·0	843
242·4	2·491	44,050	3,504	15·3	16·5	1·09	60·3	673
242·5	1·46	31,481	2,473	15·4	11·75	·76	63·5	603

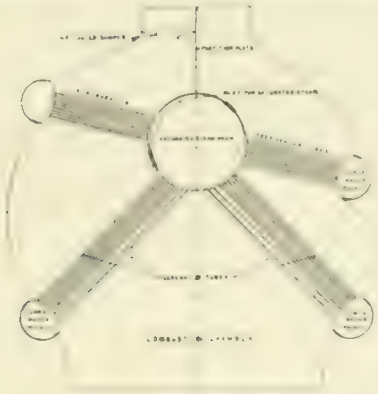


Fig. 5

of feed heating tubes the nest of generator tubes being recessed for about two thirds of its length to receive the superheater. The ends of the superheater tubes are expanded into two longitudinal steam receivers. This arrangement will probably be the most efficient for a given quantity of heating surface. Fig. 7 shows the superheater tubes placed at right angles to the generator tubes. This arrangement has the advantage that all tubes are straight. I would mention that the arrangement of running the tubes

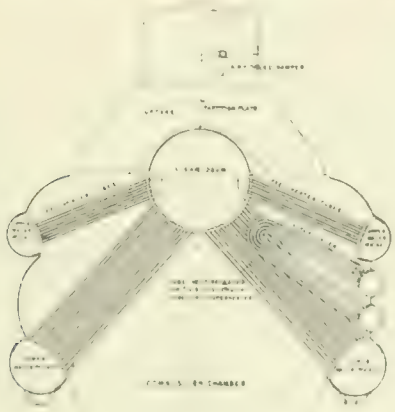


Fig. 6.

at right angles to the generator tubes has already been adopted in boilers of certain warships constructed by Messrs. John Brown and also by ourselves with the exception that a superheater was fitted on both sides of the boiler and was therefore not under the same control as in the case of the superheater fitted only on one side in conjunction with a damper.

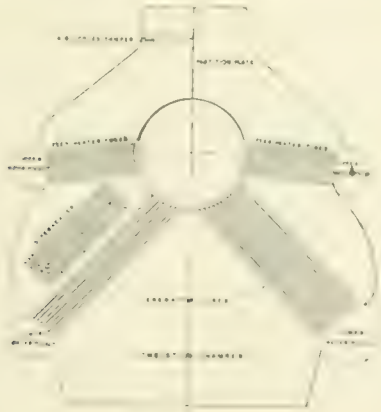


Fig. 7.

It is proposed in some cases to have an additional damper on the opposite side to the superheater, the two dampers being arranged so that either can be open or both open but under no condition can both be closed. This enables the superheater side of the boiler to be used to a greater or less extent as desired. When cruising at a slow speed this arrangement may possibly lead to a more economical result than if both sides of the boiler are equally free for the passage of the hot gases.

Judging by the best practice in land installations 100° Fahr. superheat is by no means the limit that can be adopted with advantage. It is reasonable to suppose that the required condition to be desired is that the steam should remain in gaseous form as far as possible during its passage through the turbine, because any condensation that takes place must diminish the energy given out by the steam to the blades of the turbine, also the steam remains in gaseous form and the steam friction is reduced.

I would submit from the results of the accumulated experience of others and from our own experiments that there will be a certain gain by the use of superheated steam of from 8 to 10 per cent. in fuel economy when using 100° Fahr. of superheat and from 11 to 12 per cent. gain when using 150° Fahr. of superheat in combination with a pressure of 200 lbs. per square inch. Also a further gain in fuel economy can be obtained by an efficient system of heating the feed from the gases after they have passed the generator tubes so that some of the remaining heat should be absorbed which would otherwise be lost. Although the experiments were made with an oil burning boiler the various arrangements as shown in the diagrams would be equally suitable if coal were used, and there is no reason to suppose that similar advantages could not be obtained.

With regard to the relative weights of boilers with and without superheaters provided the total heating surface were the same there would be no appreciable difference. If however the complete machinery installation is taken into account there would probably be a small saving in weight in the case of the installation with superheated steam. I would therefore submit that in the propelling machinery of warships improved results can be obtained by superheating, without increased weight cost space or upkeep and a further extension of feed heating by the waste gases.

In conclusion I should like to thank those gentlemen who have assisted in carrying out the experiment I have had the privilege of describing and also those who have assisted me in the preparation of this Paper especially my father, Mr. A. F. Yarrow, Mr. Crush, Mr. Marriner, Mr. Cotton, and Mr. Stone.

GEARED TURBINE CHANNEL STEAMERS "NORMANNIA" & "HANTONIA."*

THE fact that the turbine has to run a higher number of revolutions than the screw propeller, in order that both may develop their highest efficiency, has led to the consideration of means of transmitting the power through some reduction gear.

Electrical transmission has been strongly advocated and in cases where a great range of high efficiency is required it has some advantages. The maximum efficiency cannot however be placed at more than 90 per cent. In some cases it may be an overall advantage to sacrifice maximum efficiency in order to gain a high mean efficiency over a large range of speed. In the case of a warship in which its circumstances called for a great radius of action at moderate speed, it might be of more importance to have a high mean efficiency than a high maximum efficiency. This was the case as a rule in warships which had reciprocating engines. These were generally not so efficient at full speed as were the mercantile steamers of the same period, but their mean efficiency over the varying lower speeds was higher than if they had been more efficient at full speed.

Hydraulic transmission has been used in some cases, and the system associated with the name of Dr. Föttinger is described in Mr. Holzapfel's paper on "Gas Power for Ship

* Read at the Spring Meeting of the Fifty-third Session of the Institution of Naval Architects and contributed by Prof. J. H. Biles, LL.D., D.Sc., Vice-President.

Propulsion. Its efficiency is however below 90 per cent. at full speed. Both the electrical and hydraulic systems of transmission admit of very large powers astern without separate prime movers.

The system of transmission which is the most obvious one to adopt is that of mechanical gearing. It was adopted in the earlier days of the screw when the engine was slower running than the propeller. The gear wheel was on the engine and the pinion on the shaft. Mechanical gearing was not popular in those days. The noise was objectionable. The wear of the teeth was considerable. Its efficiency must have been low. But the gradual increase in speed of engines rendered the gearing unnecessary. The engineers blessed the decease of mechanical gearing. Its suggested resurrection was looked upon with horror. But the advent of the motor car has familiarized us with the possibility of quiet-running mechanical gearing. Machine-cut helical teeth have made it possible for us to look upon the re-introduction of gearing with some degree of hope that the most obvious method of mating the turbine with the propeller could become a practical possibility.

De Laval showed how gearing could be successfully applied in his turbine, which runs at many thousands of revolutions per minute. The Westinghouse Company have applied helical gearing to large powers on the Melville and Macalpine system. Sir Charles Parsons tried gearing in connection with his earliest turbines, but did not continue its use, preferring the disadvantages of the small screw in marine work to those of the gearing. There is, however, a limit of speed of ship, below which it does not seem to be economically desirable to go in the directly coupled turbine and screw. With a view to applying gearing to a turbine-propelled vessel of low speed the Parsons Company adapted the s.s. *Vespasian* for this purpose. Two papers have been read by Sir Charles Parsons before the Institution, describing his method of applying gearing to this vessel. The first described the results of comparison of steam trials between the old reciprocating engines of this ship and the new turbine-geared engines. These trials showed that an increase of 20 per cent. of power was gained with 20 per cent. higher efficiency. The loss due to transforming the power from the high speed of revolution of the turbine to the low speed of the propeller was only 1½ per cent. The second paper gave the results of a year's work of this vessel and showed complete justification for the adoption of this method of transforming.

In the winter 1910-11 the London and South-Western Railway Company had taken delivery of two three-screw turbine-driven vessels, the *Cæsarea* and *Sarnia*, built by Messrs. Cammell, Laird & Co. for the Channel Islands service. The design and construction of these vessels was supervised by my firm. The trial speed of these two ships was 20 knots. The sea speed required was 18 to 19½ knots. This speed is not so advantageous as higher speeds for the application of the directly-coupled turbine. The Company were considering building two similar vessels for the Havre and Southampton service. It was desired to get all the advantages of the *Cæsarea* and *Sarnia*, but with a considerable reduction of fuel consumption.

The gradual increase in the requirements of the passengers in speed and accommodation could not be met without increased H.P. and consumption. To give some idea of the growth of horse-power which has been associated with the development of the cross-Channel services of the London and South-Western Railway Company the following table has been prepared :—

	Built.	Displacement.	Passenger Accommodation.		Six hours' trial.		Remarks.
			1st.	2nd	Speed.	H.P.	
Alma ..	1894	1,350	102	51	18·5	3,250	I.H.P.
Alberta ..	1900	1,530	133	50	19·0	4,500	I.H.P.
Cæsarea and *Sarnia* ..	1910	1,990	180	114	20·0	6,670	S.H.P.

To effect the object of reducing consumption without reducing the advantages of speed and accommodation to the travelling public which had been secured in the last two steamers did not appear at first sight to be an easy problem, because these vessels were very efficiently propelled.

Perhaps it may be permissible to refer to the results of the earlier turbine steamer *Londonderry* built in 1904 to my firm's designs for the Midland Railway by Messrs. Denny, in order to show how with higher speeds higher turbine efficiencies have been obtained. The *Londonderry* attained a speed of 21·6 knots on a six hours' trial. The machinery was of the ordinary three-screw turbine type, and the water consumption on the six hours' trial was 15·7 lbs. per S.H.P. per hour. The *Cæsarea*, the London and South-Western Railway Company's three-screw turbine steamer, already referred to, obtained a mean speed of 20 knots on the six hours' trial with a mean water consumption for all purposes of 17·1 lbs. per horse-power hour. On service the *Cæsarea* was run at speeds which aimed at being about 18, 19 and 20 knots for each of a series of trips of two double runs across the Channel, and the coal used on these runs was carefully measured. The shaft horse powers were not measured, but were carefully estimated from the revolutions and the receiver pressures. The results are given in the following table :—

TABLE A.

Proposed speed	18	19	20
Actual sea speed	18·22*	18·88	19·49
Shaft horse-power	5,960	5,830	6,460
Coal per S.H.P., lbs.	1·70*	1·48	1·71

* During one of the runs at this speed the engines were eased for forty minutes in a snow-storm. If this pair of runs be omitted the coal per shaft horse-power is 1·54 lbs.

The coal used on the builders' official trial at 20 knots of the *Sarnia* was carefully measured, and showed a consumption of 1·72 lbs. per shaft horse-power.

The results given in the Table are those upon which it was desired to improve.

The dimensions of the *Cæsarea* and *Sarnia* are as follows :—Length over all, 296 ft. ; length between perpendiculars, 284 ft. ; breadth moulded, 39 ft. ; depth moulded to promenade deck, 23 ft. 10 in.

The boilers are two double-ended ones of the following dimensions :—Length, 23 ft. ; diameter, 16 ft. 5 in. ; grate surface, 338 sq. ft. ; heating surface, 12,985 sq. ft. ; pressure, 160 lbs. per sq. in.

The successful results of the Parsons Company's work in the *Vespasian* induced us to consider the adoption of geared turbines. The Parsons Company estimated that a water consumption of 12½ lbs. per shaft horse-power for the propelling engines could be obtained by the adoption of geared turbines. Allowing for the auxiliaries, the amount consumed in the *Cæsarea* we were able to make a reduction of the boiler power, so that one double and one single-ended boiler could be adopted instead of two double-ended ones. By placing these with their axes at the middle line of the ship it was possible to reduce the beam of the vessel if a form could be found which would give the necessary stability. The principle enunciated by Dr. Froude that resistance depends on the beam of the ship, the curve of cross sectional areas, and the form of the waterline forward enabled us to adopt a waterline on a reduced beam which had sufficient moment of inertia to give as much metacentric height as the wider form of the *Cæsarea*. In fact, it was found possible to reduce the beam from 39 ft. to 36 ft. The 39-ft. beam of the *Cæsarea* was necessary to properly contain the two double-ended boilers, and with this beam a fine waterline aft was full enough to give the necessary stability. The saving in weight of the reduced hull and boilers reduced the displacement and the horse-power necessary to drive the vessel. A further reduction in horse-power was made by reducing the six-hours' speed from 20 to 19½ knots. These figures are given to show to what causes it was looked to reduce the horse-power and consumption in the proposed vessels.

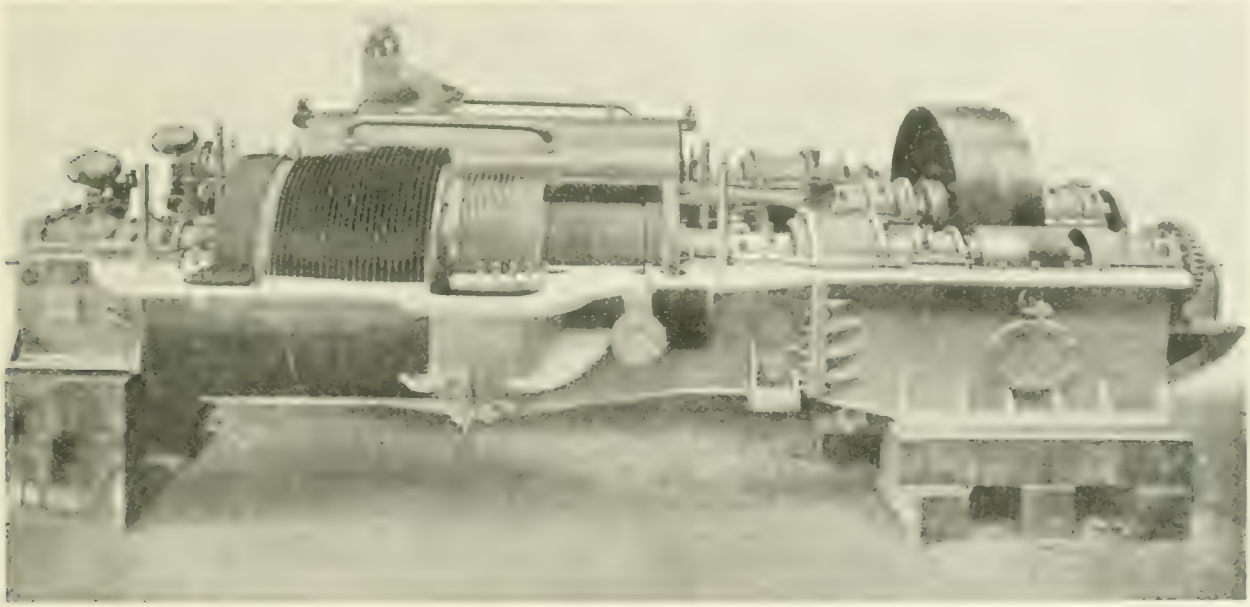
The adoption of the geared turbine was recommended by us for two reasons, first, for the reduced consumption per shaft horse-power ; second, for the adoption of two slower running larger diameter propellers, in place of three small diameter propellers, of the earlier ordinary turbine type. The advantage of the present arrangement lies in the increased efficiency of the propellers both at full speed at sea and at

manœuvring speed when entering harbours. Before such advice as this could be adopted the directors of the Railway had to give the matter most careful consideration. The time-honoured objections to gearing had to be taken into account. The chairman of the Railway, Mr. Hugh Drummond, and the marine manager, Mr. Williams, took a trip in the *Vespasian* and as a result of what they saw they took their courage in both hands and gave the order to the Fairfield Company to build two vessels with geared turbines. The first of these vessels, the *Normannia*, has been recently tried, and it is with a view of placing the results of this trial before this Institution that this paper has been written.

The revolutions of the three-screw turbine are about [illegible] while those of the two-screw geared turbine are only about [illegible]. At first sight it may appear that full advantage has not been taken of the reduction possible in gearing. In reciprocating engines of about the same power in similar cross-channel steamers the revolutions are 170 to [illegible] and the propellers are 10½ to 11 ft. diameter. These propellers have a high efficiency in smooth water, but with the limited draughts of these vessels they have not much tip immersion. Undoubtedly one of the advantages of the three-screw turbine in sea work is the great immersion of the screw tips and the consequent freedom from racing and loss of propulsive efficiency by the screws coming out of water. The diameter of the propellers in the three-screw ships is only about [illegible] ft. It is not generally possible with reciprocating engines in vessels of this size and power to increase the revolutions very much, and therefore the disadvantage of racing is accepted. In the geared turbine there is much more elasticity of choice of diameter of propeller, and it was decided to adopt a speed of revolution which would allow of a propeller of [illegible] ft. diameter to be used. This propeller has a tip immersion of [illegible] ft. more than in the reciprocating engines, while the loss of efficiency due to its smaller diameter is not serious. Judging from model experiments with screws the relative efficiencies of [illegible] ft., [illegible] ft. and 5½-ft. diameter propeller may be taken as in the ratio of about [illegible] respectively. There is reason, however, to believe that the [illegible] of the full-sized screws are not so greatly different as appears from these figures, though it is extremely probable that there is a considerable difference between the 10-ft. and the [illegible] ft. screws. Taking the relative efficiencies in smooth water into account, and the fact that in sea work the greatly increased tip immersion would increase the average sea-going efficiency of the smaller propeller, it was decided to adopt [illegible] revolutions instead of the lower number which at first sight appeared to be the best for geared turbines.

The dimensions and particulars of the geared turbine vessels *Normannia* and *Hantonia* are as follows: Length over all, [illegible] ft.; length between perpendiculars, 290 ft.; breadth moulded, [illegible] ft.; depth moulded to promenade [illegible] ft. 6 in. Boilers: Length, one double-ended, [illegible] ft. [illegible] in.; one single-ended, 11 ft. 4 in.; diameter, one double-ended, 17 ft.; one single-ended, 17 ft.; total grate surface, [illegible] sq. ft.; total heating surface, [illegible] sq. ft.; pressure, [illegible] lbs. per sq. in.

The weight carried on the trial of the *Normannia* was the same as on the *Cæsarea* and *Sarnia*. The trial took place on the Firth of Clyde. The vessel was first tried progressively, and the relation between revolutions and speed was established on the measured mile. The maximum speed at water the vessel was run was [illegible] knots with [illegible] shaft horse-power. To do the contract speed of [illegible] knots it was shown that [illegible] shaft horse-power would be required. The vessel was run for six hours and maintained an average of [illegible] shaft horse-power, which corresponds to a speed of [illegible] knots. The average air pressure in the stokeholds was less than [illegible] in.



Geared Turbines of s.s. *Normannia* and *Hantonia*.

The maximum air pressure never exceeded ¾ in.

The total coal burnt was carefully weighed out and showed a consumption per shaft horse-power per hour of [illegible] lbs. The water consumption for all purposes was 14·3 lbs. per horse-power hour. From the trials of the *Cæsarea* and *Sarnia* it was found that the water consumption for auxiliaries was [illegible] lbs. per shaft horse-power per hour, when the total consumption was [illegible] lbs., leaving [illegible] lbs. for propulsion only. In this case the shaft horse-power was [illegible]. In other cases it was measured with confirmatory results. The actual quantity of water used for auxiliaries was between [illegible] lbs. and [illegible] lbs. When running at [illegible] shaft horse-power the water consumption for auxiliaries in the *Normannia* would be [illegible] lbs., which is [illegible] lbs. per shaft horse-power hour. Hence the water consumption for the propelling engines was [illegible] lbs. as compared with [illegible] lbs. in the *Cæsarea*.

The total coal consumed in six hours in the [illegible] was [illegible] tons for the *Normannia* at [illegible] knots, [illegible] in the *Cæsarea* at [illegible] knots. In the run from the [illegible] to the *Normannia* averaged [illegible] knots, which would require about [illegible] shaft horse-power. The consumption of coal works out at [illegible] lbs. per shaft horse-power hour. The [illegible]

consumed on service in the *Cæsarea* at her highest speed is ·25 tons per nautical mile. A similar figure for the *Normannia* is not yet available but it is hoped that it will be so before the Transactions are issued.

The Illustration shows the arrangement of the gearing and turbines.

I hope that the above description, not only of the completed ship, but of the history of the design, may not have wearied the members of the Institution. It is evident that the adoption of the geared turbine enabled us to produce an improved design of ship. The only element of doubt present to the minds of those who had the responsibility of the decision was the amount of noise which the gearing would make. Undoubtedly the running of turbine steamers has pleased the travelling public by their freedom from noise. The throb of the reciprocating engines has become a thing of the past, and to introduce a means of propulsion which is not as quiet as the turbine would not be looked on with favour by passengers. A careful consideration of the causes of what little noise there was in the *Vespasian* (the only geared turbine then in existence in a ship) led to the conclusion that the noise would be negligible. The trials of the *Normannia*, and her passage from the Clyde to Southampton, have proved to those who were on board that the anticipation was a correct one. By listening carefully, when in the passenger quarters, a slight whistling sound, something like a small steam escape, can be heard. As to vibrations or trepidations, there is an absolute freedom from them, and the difference between even the ordinary three-screw turbine and this vessel is very marked. Altogether, in the opinion of those who were on board the vessel, the geared turbine, as it is at present, has nothing to fear in comparison with any other method of propulsion, so far as comfort of passengers is concerned. Time only will show whether it maintains this position, but, at any rate, a stage has been reached where the installation can be judged on its merits, and not upon the opinion of optimistic or pessimistic prophets.

DETAILS OF A MARINE ENGINE.

At the Institute of Marine Engineers, on March 4th, a paper on "Details of a Marine Engine," was read by Mr. W. Veysey Lang (Member of Council). Mr. John McLaren (Vice-President) occupied the chair.

The author took as his subject the ordinary marine engines of a cargo steamer, developing from 1,000 to 2,000 I.H.P., of the triple-expansion, surface-condensing type. In the course of the paper he said he considered that in many cases a size smaller engine and a size larger boiler or boilers would be a great improvement upon the usual practice. He had proved this by lining down the h.p. cylinder from 24″ to 22½″, or from 27″ to 25″, and the result had been a decided economy in fuel, while the speed was hardly affected. Liners in the h.p. and m.p. cylinders were most essential; in the l.p. they were negligible. The cylinder liner should undoubtedly be harder than the piston rings. In his opinion it was important that the piston rings should overrun the cylinder wall at either end of the stroke, and so prevent "ridging." Cylinder clearances of 1¼″ and ¾″ were excessive. For cylinder lagging he preferred a good mortar non-conducting composition, put on when the cylinders were under steam, and the steel sheets put on afterwards.

The main feature in the piston or steam packing ring was suitability of metal. In piston rings which relied upon outward pressure by inclined surfaces, such surfaces soon became clogged, and failed to act. Rings which were set out by steam or water pressure could not possibly give an equal pressure during the stroke, and barrelling ensued. Strong springs exerting considerable outward pressure caused great friction and loss of power, as well as abnormal wear of the cylinder wall. For the plain flat l.p. ring he preferred volute springs to the D type.

The lengths of the crank journals and pins were governed by the length of engine centres and were usually as short as possible. Increased diameter would in some degree make up for a more desirable length, and in this respect the crank pin was frequently found to be ½″ larger in diameter than the journal ends. He firmly believed in the dowelling of built shafting.

For the thrust bearing he preferred a solid thrust carriage, with heavy horse shoes bolted down on both sides, and capable of slight adjustment by screws at both ends; the wearing faces to be loose white metal shoes, carried on brass studs and adjustable by liners. With water circulation arranged in the shoes such a thrust would give no anxiety or trouble. The other points treated in detail included stern tubes, condensers, pumps, tanks, valves, drainage, packing, rods, etc., etc.

Messrs. W. McLaren, J. G. Hawthorn, F. M. Timpson and W. Walker took part in the short discussion which ensued.

The adjourned discussion took place on March 18th. Mr. F. M. Timpson (Member of Council) occupied the chair.

In the unavoidable absence of Mr. Lang, the Hon. Secretary read his reply to the previous discussion. The author said that the majority of h.p. main engine valves were doubtless of the piston type, yet, on the other hand, the intermediate and low-pressure valves were, in most cases, of the D type. He considered it was a question of suitable metal whether a flat valve ran well or not. Although it was true to say that steam which passed the h.p. valve was used up in the three cylinders, the important thing was that the h.p. valve should govern consumption both of coal and steam, and unless this cylinder was doing its work economically there was no chance whatever of the other two correcting or balancing initial waste. In regard to the drift of chain blocks, the length of chain allowed in "stocked" blocks was 10 ft. drift. For the tail shaft he was under the impression that nickel steel was only used on high-grade engines and in the Royal Navy; ingot steel was generally used in modern shafting. In regard to piston rods, valve rods, etc., it would be very convenient, and establish a closer standard in scantlings, if classification rules gave a formula for this as for shafting. There would then be no such divergence in size as now existed on similar sized engines by various builders, *e.g.*, one giving a 6½″ rod and another a 7¼″ rod for the same size of cylinder.

Mr. Wm. Walker said he heartily agreed with Mr. Lang's remarks as to the quality of metal. With slide valves in the h.p. cylinders there were difficulties, not only of wear and tear, but also of noise, although lubricants reduced the latter to some extent. Mr. Timpson cited a case where the intermediate slide valve was lubricated with a mixture of graphite and plaster of Paris. He did not think the intermediate slide valve was used to any great extent. He agreed that the sizes of piston rods should be standardised. Mr. A. H. Ledger said with regard to slide valves on the intermediate cylinder, the chief feature was that the intermediate was a double-ported valve, otherwise the pressure was just the same as in the old h.p. compound engine. He mentioned an instance where the

h.p. valve required steady lubrication with oil, and on this being dispensed with on one voyage, the friction wore down four phosphor bronze pieces 1¼" thick. There were no grooves on the valves. He did not advocate the use of oil generally, but in some cases it was absolutely necessary. Mr. G. W. Newall considered that the difference in size of the connecting rods was due to the use of iron in earlier practice instead of mild steel. He thought the number of different sizes of packings might be reduced for the various jobs. He described in detail the origin of some of the terms used in engineering. Mr. D. R. Dilworth Harrison said he had found the piston valve, when kept in good order, to be as efficient as the slide valve. The cylinder clearance in most engines, he considered was much more than was necessary. The question of drainage was important, as where there was a chance of water settling it militated against economy. He did not agree with the proposal to paint over the cast-iron part of the condensers to avert condenser troubles. A method adopted to preserve condenser tubes was to place blocks of aluminium in the water ends of tube plates, the aluminium taking the corrosion. Mr. Jas. Adamson (Hon. Secretary) emphasised the author's remarks with regard to the differences in ratios of cylinders by different makers, and also referred to the anomalies produced by the insistence upon engines being classified according to the nominal horse power. In the compound engine h.p. slide valve, the introduction of Church's slide valve with the D valve worked very well in a case that came under his observation. There were many baffling cases with regard to the corrosion of condenser tubes, and none of the explanations seemed to be universally satisfactory. He agreed with the author as to the necessity of providing efficient boilers for the size of the engines when exerting full power without forcing their fires.

The meeting closed with votes of thanks to the author and the chairman.

NAVAL MATTERS—PAST AND PROSPECTIVE.

(*From our Own Correspondent*).

Portsmouth Dockyard.

WE have been allocated one of the vessels of the new shipbuilding programme. It is officially described as a "large armoured ship," beyond which nothing is known, with the exception that the sum of £166,775 is to be spent on the ship during the ensuing financial year, which is about £16,000 less than was allowed for the vessel now under construction. The refits to be done here and their probable cost are, the battleship *Albemarle*, £64,400, the cruisers *King Alfred* and *Hawke* £9,000 and £7,[illegible] respectively; and the torpedo-gunboats *Seagull* and *Speedwell*, £7,420 and £12,637. The battleship *King George V.* has been dry-docked in order that the side armour may be fixed and the rudders shipped. The bow and stern armour is in position, the boilers and turbines are in the vessel, and the fixed portions of the armoured barbettes in place. Generally the ship is in a very forward condition. It has been announced that the battleship under construction is to be called the *Iron Duke*, a name which has only appeared in the "Navy List" once before, and which disappeared six years ago. The old *Iron Duke* which distinguished herself by sinking the *Vanguard* in 1875 was built at Pembroke in 1870, and was a central battery ship of 6,[illegible] tons. The new vessel is making headway rapidly. The *Minotaur*, which was expected to be commissioned at this port about the end of March on acceptance from the contractors, will not hoist the pennant until the second week in April. During the last week of February the Commander-in-Chief at this port received instructions from the Admiralty that the work of the Sea Salvage Company in raising Submarine A 3 was to be taken over by the dockyard, and this was accordingly done. It was not, however, until March 9th that the unfortunate vessel was raised. Next day the submarine was brought in and docked, the bodies being removed and taken to Haslar, where the funeral took place on the 13th. The bodies were interred close to each other near the graves of the officers and men who lost their lives in Submarine A 1 eight years ago. The cruiser *Powerful*, which brought home the body of the late Duke of Fife, was recently relieved as flagship on the Australian Station by the *Doris*. The *Powerful* has been paid off and is to be moored at the Mother bank, her active career being at an end. Another vessel to be taken off the effective list and sent to the Mother bank is the cruiser *Furious*, which has been received as tender to the torpedo school ship *Vernon* by the *Lancaster*. His Majesty's yacht *Alberta* is to be paid off on March 30th, after which she will be broken up. The *Alberta* was a favourite vessel of the late Queen Victoria, who made considerable use of the yacht in crossing to and from the Isle of Wight. The vessel conveyed the body of the late Queen from Cowes to Portsmouth. The cruiser *Argonaut* has completed her refit and has joined the Fourth Division of the Home Fleet. The battleship *Superb*, which had been in hand three months, left on March 14th on the completion of her refit, and the same day the *Dreadnought* arrived for overhaul. A change has been made in the designation of the new dock now under construction from "New Dock" to "Lock D." The decision to alter the dock into a lock is of importance. Besides being capable of being used for all the purposes of a dry dock the lock will also furnish a further passage-way from the harbour into Nos. 4 and 5 basins and so to the larger docks at present in use. This will considerably add to the docking facilities of this port. There is to be a dockyard sale on April 10th. Four old 27 knot destroyers the *Haughty*, *Hunter*, *Rocket* and *Banshee*, have just been placed on the sale list.

Devonport Dockyard.

The new armoured ship which is to be commenced in the coming financial year will probably be a battleship, and as only £166,073 is allowed for work on the vessel it is certain she will not be laid down until the early part of 1913. Only four refits are down for Devonport, the cruisers *Lancaster* £4,637, *Sutlej* £10,217, *Donegal* £4,531, and *Essex* £20,001. As anticipated in these columns before our latest battleship was laid down the vessel is to be called the *Marlborough*, a name dating back to 1732. The last *Marlborough* is now attached to the torpedo school ship *Vernon* at Portsmouth. Good progress is being made with the construction of the hull of the vessel. The alterations to the battle-cruiser *Lion*, which are being carried out in the North Yard, have necessitated the lifting of both masts, the foremost funnel and the upper sections of the after pair of funnels. The *Lion* should have been completed on November 30th last, but it was found necessary to extend the date to the end of March owing to delays on the part of machinery contractors in completing the turbine machinery. The alterations now being made involved a further extension and it is anticipated that the ship will be completed by the end of May. The armouring of the battleship *Centurion* has been advanced to two-thirds of the entire area. The work of building up the interior recesses of the five barbettes is making good progress and the upper deck superstructures are assuming shape. The battleship *Orion* came in on March 14th for the purpose of being placed in dock to have improved bilge keels fitted, which will keep her here about three weeks. The battle-cruiser *Indefatigable* has arrived for her first annual refit and the cruiser *[illegible]*, which has been refitted at Haulbowline, has joined the Third Division of the Home Fleet at this port. On completion of exercises on the East Coast the second Scouting Group, the destroyers *Lydiard* and *Avon* have returned to Devonport. *Avon* was left at Jarrow-on-Tyne for repairs in consequence of having been in collision with a ferry steamer on the Tyne, when the destroyer's bows were damaged. The annual dockyard sale takes place on July 6th. Seven destroyers

at this port have recently been removed from the effective list to be prepared for sale—the *Daring*, *Hawock*, *Lynx*, *Salmon*, *Snapper*, *Starfish* and *Sturgeon*. The *Valiant*, which has been for some time a depot hulk for service with the local destroyer flotilla, is also to be sold. The *Valiant* was originally a screw iron ship, armoured, of 6,710 tons, and was built nearly half a century ago. A useful addition to the docking facilities of the port will be made on April 1st when the new shallow draught dock will be brought into use. The dock, which is at the south end of the yard, will permit of the simultaneous docking of two destroyers, and will thus obviate the necessity for using the larger docks for the repair of such craft.

Chatham Dockyard.

Chatham's share of the new construction for the ensuing financial year is a "light armoured ship," for which £112,763 is allowed, and £36,376 for submarines. This does not total up to a very large amount, but as we have also been allocated the refits of nine vessels we shall not have a bad year. The vessels and the probable cost of their refits are :—The battleships *Albion*, *Canopus*, *Glory* and *Vengeance*, over £80,000 being put down for these four vessels; the cruisers *Diamond*, *Sapphire* and *Topaze*, and the scout *Sentinel*, which will cost over £45,000. The cruiser *Chatham* is making satisfactory progress, as are also the four submarines. Up to the present no particular inconvenience has been felt owing to the coal strike, but should it continue there is no doubt difficulty will be experienced in obtaining the necessary material for repair and other work. The surveying trawler *Esther*, built and engined by the John Duthie Torry Shipbuilding Company, of Aberdeen, has arrived to be prepared for commissioning. Her sister vessel, the *Daisy*, arrived for that purpose last month. The surveying vessels *Hearty* and *Triton*, which have been laid up in the steam basin for the winter months, have been joined by new crews and are now ready to resume surveying work for the season. The annual dockyard sale has been announced for May 14th, when the 27-knot destroyers *Charger*, *Dasher* and *Snapper* will probably be put up for sale, in addition to the *Undine*, the late yacht of the Commander-in-Chief at the Nore. The local branch of the ex-Shipwright Apprentices' Association, which was recently resuscitated, appears likely to become quite a vigorous branch, its membership being nearly 350. There are to be lectures on professional papers, and several social functions are to be arranged to keep the members in touch with each other. The officers of the Constructive Department are to be asked to give the Association a helping hand, and no doubt the request will be acceded to. Such associations do a great deal of good and the members derive much advantage from the lectures which are delivered.

Sheerness Dockyard.

We have nothing to complain of in the programme of refits for the coming year. Sheerness has been allotted three torpedo gunboats, the *Circe*, *Leda* and *Skipjack*, the repairs to which are estimated to cost £11,780, £10,366 and £13,827 respectively. There are fifteen torpedo-destroyers down for refit, and we shall probably get our fair share of that work. Therefore with our usual work of docking destroyers, torpedo-boats and submarines periodically, the outlook is a bright one. The submarine depot ship *Vulcan* has completed her refit and left on March 18th for Dundee to rejoin Section VII. Submarine Flotilla, and Submarine *C* 12 is also out of hand. The destroyers *Exe*, *Erne*, *Dee* and *Swale*, of the Nore Flotilla, have completed their refits and proceeded to Harwich. There are at present no vessels of the flotilla in hand here, but there are three at other yards undergoing retubing refits—the *Ettrick* at Gibraltar, the *Rother* at Pembroke, and the *Ure* at Haulbowline. We have in hand the *Zephyr* of the Nore Destroyer Division; the torpedo-gunboats, *Speedy* and *Jason*, the former refitting and the latter being prepared for commissioning; Torpedo boats Nos. 31 and 32, refitting; and Submarines *C* 7, *C* 8 and *C* 10, which are also refitting. The destroyer *Ostrich*, of the Portsmouth Destroyer Flotilla, had a narrow escape during a gale early on the morning of March 5th. She had come into harbour for a leaking condenser to be put right and was berthed at No. 48 Buoy, when, swinging with the turn of the tide, the cable parted and she drifted nearly a mile down the harbour before the wind. The destroyer sent up a rocket for assistance and the dockyard tugs *Firm* and *Tyrian* rendered aid, the destroyer being secured and taken to another buoy uninjured. Just after two o'clock the same morning the coal lighter C 120, which was berthed alongside the cruiser *Endymion*, was swamped by the rough seas and foundered. She had about 300 tons of coal in her hold. *No.* 94 salvage and mooring lighter, which was employed to lift Submarine *A* 3, returned on March 16th and will be utilized for the salving of the sunken coal lighter. The steam trawlers *Seamew* and *Seaflower* have completed refitting and have left for North Shields. The destroyer *Teviot* has arrived from Gibraltar, after having had her boilers retubed and other defects made good. She has rejoined the Nore Flotilla at Harwich. In February of last year Lieutenant-Commander Alderton, of torpedo boat *No.* 115, was drowned in the harbour after saving the life of one of his crew. A brass tablet has recently been unveiled in the Dockyard Church to the memory of the gallant officer.

Pembroke Dockyard.

Our share of the new construction is a light armoured cruiser, as it is described in the Navy Estimates, and the sum of £112,919 is allowed for its construction up to the end of the ensuing financial year. The vessel will be of an entirely new class of ship, which, according to Mr. Churchill, will consist of "the smallest, cheapest, and fastest vessels, protected by vertical armour, ever projected for the British Navy, and they will be strong enough and fast enough to overhaul and cut down any torpedo boat-destroyer afloat." We shall also probably have a share of the £140,000 which is to be expended on the refitting of destroyers. The cruiser now under construction, the *Fearless*, is beginning to look ship-shape, and it is generally understood that she will be ready to take the water about the end of May, when she will have been in hand just over five months. The cruiser *Amphion* continues to make satisfactory progress. It is reported that the contracting engineers have been granted an extension of ten weeks in the period within which they are to deliver the turbines. The turbines are, therefore, not likely to arrive before July, in which case the steam trials will not probably take place before September, and the vessel will not be ready for the pennant until about the end of the year. It is understood that the delay is owing to the turbines being of an entirely new design. The Naval Ordnance steamship *Bison* has arrived from Woolwich with the ten 4-inch guns for the *Amphion*. The refit of the scout *Attentive* is practically complete, and the vessel is expected to leave before the end of March. This has permitted the refit of the destroyer *Wolf* to be put in hand, and the work both on that vessel and the *Rother* is being expedited. The *Wolf* is to undergo a thorough repair refit, including the retubing of her four boilers. She will be the fourteenth destroyer to be retubed at this yard. The *Wolf* was completed in 1898-99, she having been built by Messrs. Laird Brothers at a cost of £52,875.

LAUNCH OF THE "AJAX."

UNQUESTIONABLY the outstanding occurrence of the month, on the Clyde, was the launch of H.M. dreadnought *Ajax*, from the yard of Messrs. Scott's Shipbuilding and Engineering Co., Greenock. This event took place on the afternoon of Thursday, March 21st, when the naming ceremony was performed by the Duchess of Sutherland. She was laid down on February 27th, 1911, and is a vessel of 23,000 tons displacement, about 31,000 shaft horse-power, and a probable speed of 21 knots. The propelling machinery will consist of Parsons turbines arranged for driving four screws. Considering the many difficulties with labour which have had to be faced, the contractors are deserving of credit for the expedition with which the great vessel has been brought to the launching stage. The scarcity of ironworkers has been a great handicap, and it says much for the efficiency of the organization at the Scott establishment that it has not found expression in more serious delay.

Messrs Cochran & Co., Annan, Ltd., of Annan, Scotland, have just issued a little brochure which admirably illustrates the internal accessibility of the Cochran boiler. There are eight illustrations reproduced from photographs of one of their standard boilers, 6 ft. diameter by 14 ft. high, clearly demonstrating the readiness with which a man can reach every part of the boiler for the purpose of cleaning and inspection.

THE DJINN HEAVY OIL ENGINE.

THE Djinn heavy oil marine motor which is illustrated has four cylinders of [illegible] in. diameter and [illegible] in. stroke, developing at [illegible] r.p.m. a B.H.P. of [illegible] when using kerosene with specific gravity [illegible]. The photographs reproduced show Fig. 1 the fore and aft views and Fig. 2 the end view showing the chain drive gear. The structure of the motor is adapted to suit marine service and is yet suitable for light draught vessels and is built to meet the Board of Trade and classification society rules. The cylinders are cast in pairs with open jacket ends fitted with doors bolted on at the terminals of the motor, whether of four or six cylinders. This arrangement is very convenient for the valve gear and flow of gases. The columns are of steel bolted through the bedplate, and a light oil-tight crank case is thus alone necessary. It is fitted with large doors to admit of ready access for examination and overhaul. The solid bedplate casting has five long bearings carried on strong cross pieces on each side of the centre bearing which like the two outer bearings are of box section support; at the after end there is a solid bracket extension with a bracket and bracket for the reverse gear. The whole of the bearings including the extension, are bored out by machine to secure accurate alignment. The bedplate contains at the bottom a reservoir of oil capacity for sixty days and is so constructed that no outflow reaches the bilge. The crankshaft is a solid forging and the working parts are made above the minimum size; the flywheel is on the forward end of the shaft with a bracket over it for the starting gear made so as to serve as a cover to prevent a scattering of bilge water. The cam shaft on which the cams are keyed and pinned, has a solid flange at after end on which is fitted a large registered timing wheel. The bearings for the shaft are supported on separate cast iron pedestals, bolted to the bedplate, and so fitted as to admit of ready removal when necessary at the forward end of the cam shaft, the vertical shaft revolved by bevel wheels actuates the magneto and combined distributor. The magneto is protected by a water tight casing. The vaporizing system is arranged so that each pair of cylinders has its own fuel supply and there are no induction pipes. The fuel is supplied to the atomizing pot chamber by a pump and after mixing with air passes into the vaporizing tubes whence it is drawn by suction to the engine. The mixture is then mingled with extra air admitted through an automatic valve and passes to the cylinder. There is a hand throttle control on each cylinder linked to a shaft on which the hand lever is fitted. In the larger engines the governor controls the throttle valve against racing but there is also a separate hand throttle for manœuvring. The necessary

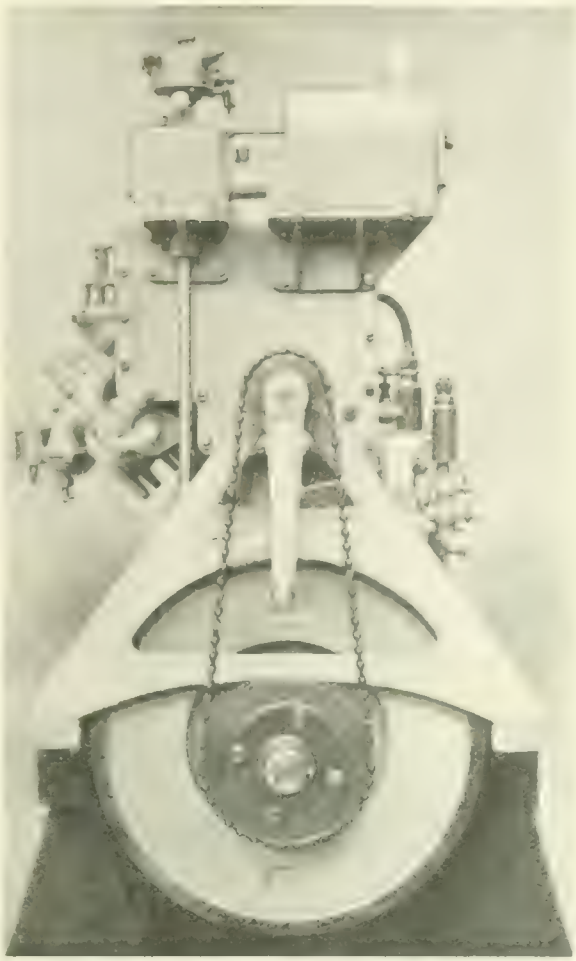


Fig. 1.

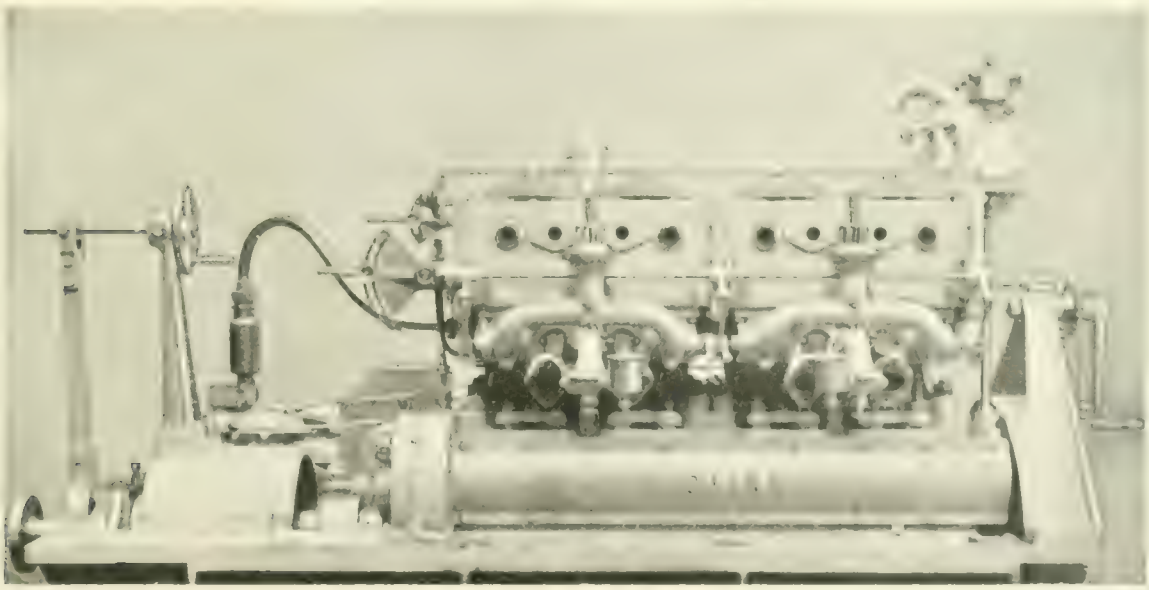


Fig. 2.

pumps and gear for water cooling, bilge, fuel and oil are grouped together to minimize the area which is under the controlling hand and eye of the attendant. The plungers of each of these pumps are of the solid bronze plunger type, with ball valves for the small and wing valves for the larger bore. The cooling water, fuel and oil pumps are worked from an eccentric; the bilge pump is also worked from an eccentric. The cooling water is delivered through a perforated pipe led inside the jacket the full length, thus ensuring distribution. The oil for lubrication is led through a main pipe with branches for the various bearings, with special connections to the crossheads, the whole system of lubricating has been carefully thought out and adjustments fitted to keep the pressure steady. The reversing gear and thrust block have also been designed and fitted with due regard to their importance in the working of the machinery. The consumption of fuel is guaranteed not to exceed ·6 pint per B.H.P. per hour, and under test trials it has been ·49 per B.H.P., and the consumption of lubricating oil ·008 per B.H.P. per hour. The average temperature of cooling water has been found on trial to be 65°F. on entry, 124° at exit. The fuel used for testing purposes is usually Russian and American petroleum. The weight of the engine illustrated is 45 cwt., but if desired for special purposes where weight is of moment, this can be reduced without loss of strength or efficiency. The makers of the Djinn engine are Messrs. Brazil, Straker & Co., Ltd., of Bristol.

COMBINED RECIPROCATING AND TURBINE ENGINES.*

(*Continued from Page* 301).

THERE are certain objections which will be brought against my arrangement, and some of these are important and have been carefully considered. It may be asked, why sacrifice the manœuvring power of two propellers on reversing engines for that of one? In reply to this it is claimed that the advantage of a simpler and cheaper arrangement with the most effective propeller on the centre line of the ship and the promise of better economy, should outweigh any possible advantage for manœuvring that the twin screw has over the single screw ship. It is quite possible that this advantage may be over-rated. The writer, from his office window, has the opportunity to watch the docking of two steamships once a week. They are sister ships in every respect, except that one is a single screw while the other has twin screws. Each vessel is of 5000 horse-power and 400 ft. long on the water line. The dock that these vessels land at is across the tide which runs either one way or the other with the flood or ebb. The writer is interested in these vessels, both having been built under his supervision, and yet after careful observation, extending over three years, he has not been able to observe any marked advantage that the one has over the other in making a landing at the dock, no assistance is ever required by either of them. Two days ago he timed the single screw vessel and found that the time consumed from being abreast of the end of the dock to being moored alongside was just 6·5 minutes. In a larger ship, the turning effect of running the screws in opposite directions would be still less than in the ships mentioned above. The backing power of the single large propeller on the centre line when the engine exhausts to the condenser would be ample for all purposes.

Another objection that might be raised to the arrangement advocated by the writer, is that a breakdown of the reciprocating engine would deprive the ship of any backing power. This objection must be admitted, yet from the simple construction of the proposed reciprocating engine, a breakdown involving the stopping of the engines for good seems rather a remote possibility, and, if it should happen, the turbines could keep the vessel going ahead until she could arrange by wireless for assistance in making port.

These are the two principal objections that can be advanced against the arrangement that the writer proposes, while, if he is right in the claim that the turbine can show a higher efficiency than the reciprocating engine to a point much higher in the expansion curve than 9 or 10 pounds absolute, then the arrangement he proposes would give a better combined economical result and be simpler and less expensive. The chances for air leaks, where the reciprocating engine delivers the steam to the turbines at 30 pounds absolute, is reduced to one stuffing box at the condenser end of the low-pressure turbines, while, in the case of two sets of reciprocating engines exhausting to one turbine at 9 or 10 pounds absolute, there are always possible air leaks at both ends of the turbine and at the stuffing boxes of both low-pressure cylinders of the reciprocating engines.

In one arrangement proposed by the writer, the air pumps, both wet and dry, are operated from the low-pressure cylinder crossheads. This might be objected to as not providing any means for maintaining a vacuum should the reciprocating engine be disabled. The object in making the air pumps part of the main reciprocating engine is simply one of first cost and some advantage in economy of steam and of work in caring for the pumps. The writer has forestalled this objection and prefers the independent pumps as an additional security against any failure of the reciprocating engine. Of course, independent air pumps can be installed, in which case they should exhaust into the turbine steam chests. The sketch plan shows this arrangement. (See pages 298 and 299, March issue).

In a paper read by A. C. E. Rateau at the Jubilee Meeting of the Institution of Naval Architects on July 5th of last year, there seems to be something that would indicate that the arrangement proposed in this paper had been considered by Professor Rateau. He says that, "In 1906 we fitted the French destroyer *Voltigeur* with an improved arrangement of engines. The power is distributed on three shafts (centre shaft reciprocating engine with turbines on wing shafts). Up to a speed of 20 knots, the reciprocating engine exhausts into the turbines, but above that speed the engines become independent. We could therefore have realized a perfect engine up to a speed of 20 knots if the reciprocating engine and the turbines had been designed solely with the view of obtaining better results by working by stages, but instead of this, they were designed more particularly with the object of obtaining the maximum efficiency at full power." In other words, the Professor, by providing a third condenser for the reciprocating engine to exhaust into at full power, added to the power developed at the expense of the lost economy in the low-pressure end of the reciprocating engine and in the high-pressure end of the turbine and, even when exhausting from his reciprocating engine into the turbines, he lost in economy by using low-pressure steam in turbines designed to be operated by steam direct from the boilers.

In utilizing the expansion in reciprocating engines down to a pressure of, say, 9 pounds absolute, we must have cylinders of large dimensions subject to marked changes in temperature every revolution, involving large losses due to condensation combined with large frictional losses causing a great curtailment in the theoretical gain due to the expansion; on the other hand, by turning the steam over to the turbines at a pressure and temperature that ensures a more economical continuation of efficiency in the power developed, we thereby succeed in obtaining the very best possible out of each type of engine.

All this, of course, has been considered by the able engineers who have designed the important installations of combined reciprocating and turbine engines that have been fitted to equally important additions made lately to the great steamships of the world. The writer thinks, however, that the desire to hold on to the advantage claimed for the twin-screw ship in manœuvring and the ability to continue a voyage with one engine disabled, may have had much to do with determining the arrangement of these great combinations of reciprocating and turbine engines. The installation on the *Olympic*, for instance, can hardly be called a combination of reciprocating and turbine engines, but rather a splendid example of reciprocating engine practice with a turbine in the exhaust to utilize the last stage of expansion which the low-pressure cylinder could not manage with any efficiency.

In the arrangement proposed in this paper, there is no sacrifice of go-ahead power with either the reciprocating engine or the turbines disabled, but only a sacrifice of backing power should the reciprocating engine be out of commission. The question is one that ought to form a good subject for discussion by this Society.

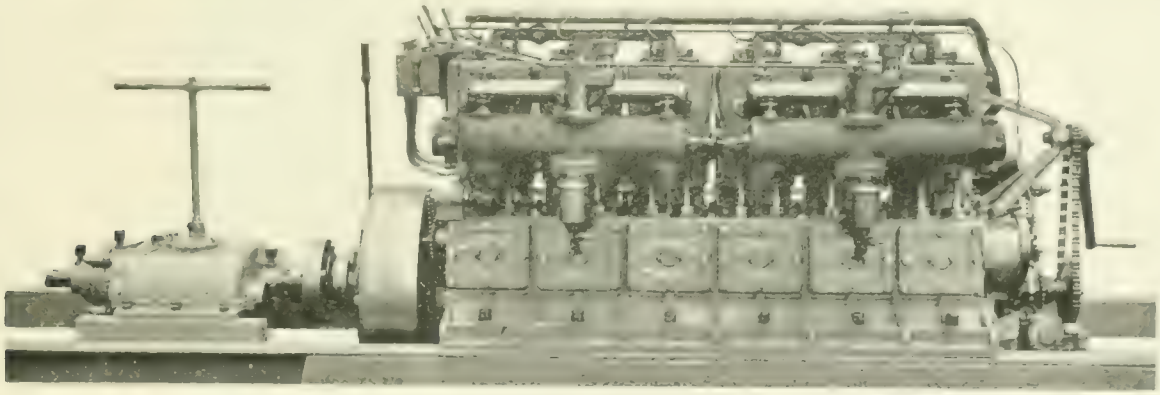
*Read before the Society of Naval Architects and Marine Engineers, New York, by G. W. Dickie, Esq., Member of Council.

MARINE MOTOR NOTES.

THE visit of the motor ship *Selandia* to London from Copenhagen prior to her departure to the East via Antwerp afforded a good opportunity to those interested of inspecting this vessel and forming opinions on the subject of the machinery, and incidentally drawing a comparison with that of the steamship in respect to handiness in working, overhauling and general upkeep as well as economic running costs. The conclusion appears to be well established from the average results obtained on the trials and subsequent voyages, combining the experience gained in smaller vessels which as a criterion is all in favour of greater economy in the larger powered ships. The engine room staff is smaller than in the steamship, due to the stoke hold element being cut out, the watch-keeping engineers and their assistants remaining about the same. The opening up of the details for examination and overhaul, adjusting of cranks and crossheads, methods of lubricating these and the piston rods, the reversing gear, the means provided for changing over from crude to solar oil when necessary to cleanse the cylinders from residue, the effect of racing in a sea way with the propeller elevated, then submerged, and the load on the engines thus intermittently decreased and increased were each and all discussed by marine engineers amid the surroundings in the engine-room, under a consciousness that the time is approaching when they will require to stand in similar jobs to not only discuss these details but to manipulate them to the best advantage. Since the *Selandia* sailed on her voyage, the engines have been well tested for reliability when crossing the Bay under conditions which are always a trial to the governor and connections. Turning now to smaller craft, the Kilmartinglock, just also heralded the advent of the steam lighter on the waters of the Forth and Clyde canal, should have an inspired accompanist to extend the poem, portions of which appeared in the March issue, to celebrate the appearance of the motor lighter, especially as Messrs. Macgregor are building for the fleet of coasters now fitting in Leith for the East and West coast of Scotland. Messrs. Barclay, Curle & Co. are looking forward to satisfactory results from the *Lowlander* and this view appears to be entertained by the Leith Docks Commission, from the report that another and a larger motor lighter is to be built for the firm. The canals are gradually, but slowly, being [illegible] of by motor lighters, and the conversion of the passenger traffic again within six months has helped forward the movement, the tendency being to reduce the wages and the profit of those employed in the carrying operations, which by diverting part of the traffic to the water ways, tends to put up the scarcity of coal is tending to open up other sources of power and heat supply and reduce the wages of the miners and the profits from the mines. The increased price of coal meantime is furthering the adoption of oil for fuel, as well as the motor engine.

It has been [illegible] that the *Selandia* has run on an average consumption of [illegible] per [illegible] about 3,300 miles, and the owners have several motor vessels of similar type being constructed. The Pilot boards are further considering the motor vessel service, thus showing a growing confidence in the type for long cruising service. The motor vessels which have been moving around British waters during the past months have made the type of machinery familiar to every marine engineer, and there is every prospect that the present year will show a considerable increase in the size and number of motor vessels. The question of fuel supply and possible advance in price bring one to careful consideration, but the oil companies have evinced a desire to meet the question by preparing to establish more depots and guarantee prices well ahead, while apart from the oil producing wells which may become exhausted in time, the whole tendency is towards adhering to petroleum, a spirit adaptable for use in explosive engines.

The Atlas Gray Motor Co., manufacturers of boat and motor boat building, make a speciality of propellers of all kinds, reversing gears, clutches, whistles, lights, and all other accessories required for such craft. These are enumerated, illustrated and described in a useful booklet issued by the Company. The Parsons Motor Co. have a good [illegible] work in hand and recently supplied motors for Sir Jas. Pender's yacht, renamed the *Lassoria*, Messrs. Camper & Nicholson, Gosport, having the overhaul and refitting in hand. The yacht is 114 ft. by 23 ft. by 14 ft. The motor is fitted with patent vaporizers and is composed of two units of three cylinders, each unit having its own vaporizer, fuel feed, air valve and other details, and two water circulating pumps. The governor is connected to the throttle valves for controlling the speed; there is also the hand-control lever. The clutch for reversing is made of special material and reliable. The lubrication of the bearings is on the sight-feed system, and provision is made to facilitate examination of working parts. There are two separate ignitions fitted, magneto and battery with [illegible] timing gear, a patent accessory of the firm. Another notable special feature was the concentric valve in this type of motor, the annular space of which formed a vaporizer for the parafin. More recently however separate inlet and outlet valves have been fitted with precautionary arrangement to counteract the heat of the charge and avoid condensation; the tappets are spring-loaded to give quiet running; the valves are interchangeable. Messrs. Brazil, Straker & Co., whose oil motors for winches are to be fitted in some of the West of Scotland coasting vessels, are also [illegible] engines of substantial construction are good [illegible]. The [illegible] after several runs on the Thames, left for the Continent, and, probably, may be disposed of and a larger and more powerful vessel to be built in the place, owing to the [illegible] which has attracted the [illegible] left the Clyde. The large number of motor vessels now in hand, both in Britain and on the Continent, will serve to drive engineers to the desirability of obtaining practical experience in the construction and working of the internal combustion engine, and it has been in another branch of connection with the proceedings of the Institute of Marine Engineers that the subject has been [illegible] for some years. The next step is to urge the desirability of obtaining engineers' certificates for marine motors.



90 h.p. six-cylinder Parsons' Marine Motor Set, paraffin type—550 R.P.M. (see Marine Motor notes).

FOREIGN NOTES.

France.

THE activity in shipbuilding is now increasing, and many orders for steamers are being placed with leading shipyards, etc., two cargo steamers are being constructed by the Chantiers de Normandie for the Compagnie Transatlantique. They will have passenger accommodation. The Messageries Maritimes have given an order for a mail steamer to the Chantiers La Ciotat. This steamer is to be fitted up with luxurious accommodation for passengers similar to the Company's other mail steamers. The Chantiers de la Loire have also received an order for two cargo steamers of 4,000 tons each. These vessels are to be used for general cargo purposes only.

The shipping firm Leblond Lerous, of Rouen, has just purchased five sailing vessels of 2,200 to 2,000 tons each from the Société de Navigation, to be chiefly employed on long voyages to the Far East and to South America.

The *St. André*, a cargo steamer of 7,800 tons, has been launched successfully at the Chantiers de la Loire. She is intended for the service of the Compagnie de l'Océanie.

Germany.

The Petroleum Steamship Co., Ltd., of London, has placed an order for a petroleum tank vessel of 7,200 tons with the Weser shipyard of J. Frerichs & Co. The vessel is to be constructed with twin screws to Lloyd's regulations and is to be equipped with a motor of 2,200 ef. h.p. on the Junkers-Diesel patent system. The vessel will be 121·1m. long with a beam of 15·09m. and a draught of 7·4m. Oil tanks for fuel are fitted at the side of the engine-room. The same shipyard has already booked another order for a motor tank vessel of 4,000 tons capacity from a German petroleum company. Three cargo steamers, one of 5,000 tons and two of 9,000 tons each, are also in course of construction at this yard. The "Hansa" Steamship Company have given out an order for two steamers of 9,000 tons each to the Weser shipyard at Bremen, and a third steamer of the same capacity to the Flensburg Shipbuilding Company. These steamers are to be completed rapidly for service in cargo and passenger traffic.

The *Bahia Blanca* has been put through her trials with very good results. This steamer of 12,000 tons and fitted with two triple-expansion engines obtained a speed of 12 knots. She is to enter on her duties in the South American service at once.

The *Kaiser Friedrich*, a liner built to the order of the Hapag Company in the year 1900, has just been sold to a French company to run in the Marseilles-La Plata Line, the purchase being subject to the trial voyage being satisfactory, which is now taking place. It will be recollected that the *Kaiser Friedrich* was built by F. Schichau, but as she failed to reach the contract speed the Hapag refused to take the steamer over, and she has been lying in the Hamburg port for about eleven years.

The English four-masted barque *Eclipse* has just been sold for the sum of £15,000 to a Hamburg shipping firm.

Japan.

The Japanese Government intend to provide for a large increase of the fleet to be completed in seven years. The plans include eight "Dreadnoughts" and eight armoured cruisers, besides two cruisers of smaller type. These ships will involve an enormous outlay, but it is considered necessary to carry out the project.

The keel plates of the *Fuso* are to be laid very shortly in a Japanese yard. The vessel is to have a displacement of 30,000 tons.

Russia.

The Goteburg shipyard has lately completed an ice-breaker for Riga, which is especially worthy of notice. It has been given the name *Peter the Great* and has already been delivered to the port of Riga. Water tanks are provided on each side of the vessel. These tanks have a capacity of 700 tons, and by filling and emptying the tanks the vessel can be made to list over from one side to the other in order to break the ice. Her powerful centrifugal pumps of 40 tons capacity per minute each can also be used for salving purposes. A telemotor steering apparatus is fitted. The engines worked very satisfactorily on the trial trip, developing 2,800 h.p. and giving the vessel a speed of 13·2 knots. By means of this new ice breaker the port of Riga will be kept open during the winter much longer than is now possible.

Very extensive Government works are to be carried out as speedily as possible in various constructions for naval purposes, including three large dry docks and a floating dock, one of which is to be able to take a battleship of 30,000 tons displacement.

Belgium.

The Government has placed an order with the Cockerill shipyard for two mail steamers for the Ostend-Dover Line. They are to be supplied with turbines like their predecessors. Frahm tanks will be fitted and these vessels will be the first Channel steamers to be so fitted. The steamers will have a speed of 24 knots, enabling them to complete the passage easily in 2½ hours. Modern equipment is to be provided on board, also a wireless telegraph plant.

A large sum is to be expended for tugs, cargo steamers and other river craft for traffic on the rivers of the Congo State. It is said there is also a very good market for all kinds of motor and steam vessels there. Resident merchants find it is absolutely necessary to have craft of this kind at their disposal.

Greece.

Tenders have been invited by the Government for one battleship, four destroyers and six torpedo boats, with the result that the representatives of a large number of competitors have come to Athens, ten being English, four French, three German, three American, two Italian firms and one Austrian. The armament is quoted for, among others, by Vickers, Armstrong, Coventry Ordnance Co., Krupp and the Bethlehem Steel Co.

Turkey.

The Government has the intention to acquire six tug steamers and twelve lighters for service on the river Tigris. Enquiries to be addressed to the Secretary of the Domaines de l'Etat at Constantinople.

Association of Engineers-in-Charge: Seventeenth Annual Dinner.—A large number of members and guests attended the dinner of this Association, held on March 23rd at the Holborn Restaurant, under the chairmanship of W. H. Maw, LL.D., M.Inst.C.E., M.I.Mech.E. (the president), the vice-chair being taken by Mr. Alf. E. Penn (chairman of the Association). Among those attending were Dr. Wm. Cawthorne Unwin, F.R.S., LL.D., M.Inst.C.E., Edgar Worthington, B.Sc., M.Inst.C.E., M.I.Mech.E., Dr. H. S. Hele-Shaw, F.R.S., M.Inst.C.E., His Honour Judge Rentoul, K.C., LL.D., Capt. H. Riall Sankey, R.E. (ret.), M.Inst.C.E., M.I.Mech.E., Sir Ernest Shackleton, C.V.O., F.R.G.S., F.R.A.S., Rev. J. H. Anderson, M.A., H. Percy Bouluois, M.Inst.C.E., Frank Bailey, M.Inst.C.E., M.I.Mech.E., B. A. Rayworth, M.Inst.C.E., M.I.Mech.E., H. Hirst, I. Y. Fletcher, Sir Thomas D. Pile, Bart., LL.D., J.P., Alex. Ritchie, J.P., F. Broadbent, M.I.E.E., W. T. Pickett (vice-chairman of the Association), H. E. Neale, J. R. Manning, H. Cumper, L. B. Giles, A. Davey, M.I.Mech.E., R. Thorp, Hy. Swann (hon. treasurer), and S. M. Singleton (hon. secretary). After the customary loyal toasts had been honoured, Dr. Wm. Cawthorne Unwin proposed the "Association" in an excellent speech, and the President replied in a few well-chosen words. Mr. A. Davey proposed "Kindred Institutions," and owing to the regrettable absence through ill-health of Mr. E. B. Ellington, M.Inst.C.E., M.I.Mech.E., Capt. H. Riall Sankey responded. The toast of "Guests and Friends," proposed by Mr. Hy. Capsey, was replied to by Mr. H. Hirst and His Honour Judge Rentoul also replied in his usual witty manner. Sir Ernest Shackleton also made a few remarks which commanded the attention of those present. Mr. A. E. Penn proposed the "Health of the President," and a brief acknowledgment by the President brought an enjoyable evening to a close.

OBITUARY.

John Ward: Shipbuilder.

WE have, with great regret, to place on record the death of Mr. John Ward, partner in the two well-known Dumbarton firms of Messrs. William Denny and Bros., shipbuilders, and Messrs. Denny & Co., engineers. The sad event took place suddenly on the evening of March 20th at his residence of Garmoyle, Dumbarton, as the result of a shock traceable to a serious illness from which he suffered in the summer of [illegible] and from which he had never completely recovered, although he was at [illegible] during the afternoon of the day on which he [illegible]. The [illegible] is felt as a distinct loss not only in the town of Dumbarton and over the Clyde district, where he was warmly [illegible], but over a much larger area. He took an active and sympathetic part in deliberations affecting the interest of employers and workmen all over the [illegible] and acted frequently during recent years as one of the representatives of the Clyde Shipbuilders' Association at [illegible] conferences with the Shipyard Trades Standing Committee at Carlisle and Edinburgh. He took a deep interest in the work of the Institution of Engineers and Shipbuilders in Scotland, of which he was president during the two sessions [illegible].

Mr. Ward, who was in his 65th year, was born at Stranraer in the year [illegible], but at the early age of [illegible] began his working career at Hull, to which town his parents had removed when he was [illegible] years of age. His first employment was in the shipyard of Messrs. C. & W. Earle (now Earle's Shipbuilding Co.), then and subsequently associated with men whose names rank high in the profession of naval architecture and shipbuilding. Mr. Ward's apprenticeship, however, was not completed at [illegible] he went to London and [illegible] in the drawing office of the Millwall [illegible] Shipbuilding Company. Although in those days the Thames was an important shipbuilding centre and [illegible] naval architecture which no other [illegible] in the [illegible] shipbuilding [illegible] found [illegible] to the valley of the Clyde [illegible] the northern river all the aspirants for a thorough training in up-to-date practice sought to gravitate. In [illegible] Mr. Ward secured a place in the drawing office of Messrs. Robert Steele & Co., Greenock, where he remained three years. In 187[illegible] he joined

The Late Mr. John Ward.

Photo [illegible]

the shipyard drawing office staff of Messrs. Wm. Denny and Bros., Dumbarton, where in a few years he rose to the position of chief draughtsman. In 1877, when only 30 years of age, his assiduous attention to duty and his employers' interests, no less than his professional ability, secured him the post of shipyard manager, and the further recognition of these qualities by the principals of the firm, Dr. Peter Denny and his son, Mr. William Denny, found expression in receiving Mr. Ward into partnership in 1885.

Of the late Mr. William Denny as a scientific shipbuilder, with originality and intrepidity in initiating new departures and effecting developments in shipbuilding, there is at this day no need to speak, but to Mr. Ward, as his willing and able henchman in carrying out ideas in practice, due meed of praise is at this time permissible. On Mr. Ward largely devolved the practical responsibility of building the *Rotomahana*, the first ocean-going steamer constructed of Siemens-Martin steel, as well as the Allan liner *Buenos Ayrean*, which proved conclusively not only the superiority of the material for shipbuilding purposes, but its entire suitability in sea-going service.

The scientific research carried on by Messrs. Denny Bros. into the speed and power problems connected with ship design—initiated by William Denny and carried on by him with the intelligent support of his partners in the engineering firm of Messrs. Denny & Co., the late Mr. Walter Brock, Mr. James Denny, etc.—resulted, as every one knows, in the two firms being called upon to produce leading examples in high-speed channel steamers, paddle and twin-screw. In the production of these craft—to name which would be superfluous—Mr. Ward, jointly with Mr. (now Dr.) Archibald Denny, had a highly responsible share. But the propulsive agencies—or the engineering side of shipbuilding—quite as much as the design and construction of hull form, in these "pioneer" or "pattern" craft, constitute a prime factor in the results, and both Mr. Ward and Dr. A. Denny have had share in this aspect of the high repute attaching to the two Dumbarton concerns, of which, since 1885, they have been partners.

To them and to their co-partners on the engineering side—Mr. James Denny and the late Mr. Henry Brock—and to the close study they were enabled to make of the steam turbine as fitted on board the *Cobra* and other torpedo-boat destroyers, it was given to be associated in the production of the pioneer turbine mercantile steamer—the *King Edward*. The syndicate formed to build and manage this vessel, Turbine Steamers, Limited, included members of the two Dumbarton firms, and with it also was associated Sir Charles A. Parsons, the introducer of the turbine, who rendered invaluable aid to the enterprise as technical adviser—whose firm of Messrs. Parsons' Marine Steam Turbine Co., in fact, supplied the turbines. The success attending the *King Edward*, as well as the *Queen Alexandra*, which soon followed, is a matter of history, as is also, indeed, the production of the pioneer combined recipro-turbo steamer *Otaki* for the New Zealand Shipping Co., Ltd.

The management of Leven Shipyard, as regards at least the control of the practical working forces, mostly devolved on Mr. Ward, and his success in that onerous capacity was a matter of admiration in industrial circles even beyond Clydeside. He fully recognised, under the traditionary conditions of association with the Messrs. Denny, the ideal of mutual sympathy between employers and employed. His attitude towards, and dealings with, the workmen were always considerate and conciliatory, and the conditions of employment were such as reduced disputes to a minimum and made them, as a rule, easy of adjustment even when the disputes were between workmen and workmen entirely. Mr. Ward took a special interest in educational affairs. He was a life governor of the Glasgow and West of Scotland Technical College, a member of the Council of Allan Glen's School, and was for nine years chairman of the Dumbarton School Board, during which period he specially emphasized the value and furthered the interests of evening classes for the instruction of apprentices. Mr. Ward was a member of various professional bodies; as already stated he was a member of the Institution of Engineers and Shipbuilders in Scotland, and for two sessions filled with distinction the presidentship; he was a member of council of the Institution of Naval Architects; a member of the North-East Coast Institution of Engineers and Shipbuilders, and of the Technical Committee of Lloyd's Register of Shipping. Mr. Ward, who was twice married, is survived by a widow and a grown up family of three sons and five daughters.

THE DIESEL OIL ENGINE.

There was a very large attendance at the Institution of Mechanical Engineers on the 15th March to hear Dr. Diesel's paper.

Dr. Diesel said that since its appearance about fourteen years ago the Diesel engine had been built by the thousand in the best factories of all industrial countries, and had been set up in the most remote corners of the world. It had been proved to be a most reliable engine when properly built, the working of which was quite as safe as that of any other system of prime mover; in general, it was even more simple, since it did not require any auxiliary apparatus, and since the fuel in its natural and original form was directly converted into work in the cylinder of the engine. To-day the thermal or indicated efficiency of the engine was 48 per cent., and the effective or brake efficiency reached, in some cases, 35 per cent., of the heat value of the fuel. The Diesel engine converted the heat of the natural fuel into work in the cylinder itself, without any previous transforming process.

The Diesel engine had broken the monopoly of coal, and had solved the problem of using liquid fuel for power-production in its simplest and most general form. It had become for all natural liquid fuels what the steam engine and gas engine were for coal, but in a much simpler and more economical way. The truth of that statement was strikingly proved last year at the Turin Exhibition, where, in the large machinery hall, a steam turbine and a large Diesel engine, both made at Milan, and set up on the same stand, were worked together with the same liquid fuel. The boilers belonging to the plant were fitted with Körting nozzles for burning crude oil. The difference between the two plants was this:—For the working of the steam engine the whole boiler plant with its chimney, fuel supply apparatus, purification plant for feed-water with feed-pumps, extensive steam pipes, condensation plant with water-pumps, and an enormous water consumption had to be provided, with the final result of consuming 2½ or more times the fuel per horse-power required by the Diesel engine standing beside it.

The Diesel engine had doubled the resources of mankind as regards power-production, and had made new and hitherto unutilized products of nature available for motor power. The engine had thereby exercised a far-reaching influence on the liquid-fuel industry, which was at the present time improving more rapidly than was previously conceivable. Owing to the interest which petroleum producers had taken in this important question, new petroleum sources were continually being developed, and new oil districts discovered. It had been proved by recent geological researches, not only that there was probably on the globe as much, or perhaps, even more, liquid fuel than coal, but also that it was more conveniently distributed as regards its geographical position.

Safely it might be asserted that, with the continual development of new oil-districts, the production of mineral oil would increase much more quickly than the demand for newly built engines.

It had been proved that Diesel engines could be worked on arachis or earth-nut oil without any difficulty, and the author was in a position to publish, for the first time, reliable figures obtained by tests:—Consumption of earth-nut oil, 0·53 lb. pr b.h.p. hour; calorific power of the oil, 8,600 calories (34,124 B.Th.U.) per kg., thus fully equal to tar oils; hydrogen, 11·8 per cent. That oil was almost as effective as the natural mineral oils, and, as it could also be used for lubricating oil, the whole work could be carried out with a single kind of oil produced directly on the spot. Thus the Diesel engine became a really independent engine for the tropics. Similar successful experiments had been made in St. Petersburg with castor-oil; and animal oils, such as train-oil, had been used with excellent results.

* Abstract of a paper read before the Institution of Mechanical Engineers on March 15th by Dr. Rudolph Diesel, of Munich.

In regard to the importance of the Diesel engine for Great Britain, Dr. Diesel said the three facts which had to be borne in mind were :—

(1) Great Britain is an exclusively coal-producing country ;
(2) Great Britain has the largest colonial empire in the world ; and
(3) Great Britain is the greatest shipping nation in the world.

Up to the present time Great Britain had had no natural liquid fuels of its own, and it had been put forward in recent times that England had no interest in the Diesel engine, and that it was against her most vital interest to participate in its development, as she would neglect her wealth in coal and make herself dependent on foreign markets when using liquid fuels. England had made great progress in power generating with gas, whilst she had up to the present given relatively little attention to power generating with liquid fuels. But the truth was that England had the greatest interest in replacing the coal wasting steam engine by the more economical Diesel engine, for by so doing she could therewith effect enormous savings in her most valuable treasure—coal—and thus defer the exhaustion of her stock. She would also be able to run her coal industry and the independent chemical industries on more economical lines.

Even when using only the natural mineral oils, the Diesel engine was the predestined colonial engine, because only about the fourth or sixth part of weight in fuel had to be transported for it to the Colonies and their hinterlands, as compared with the steam engine. For a colonial engine the cost of freightage for fuel was generally the determining factor. Further, the transport of these liquid fuels was considerably easier and more convenient than the transport of coal, especially when tank-vessels and pipe-lines were used.

When the first successes of the Diesel engine for marine work were heard of in England, and it became known that already numerous small mercantile and war vessels were fitted with Diesel engines, and the possibility of more important plants was mentioned, and when it was realized that larger ocean vessels were destined to be fitted with these engines, it provoked a great movement in Great Britain. The reports about successful voyages with Diesel vessels under very difficult weather conditions were already increasing in number. The captains who had had Diesel engines on their vessels reported on the great security and comfort in working, and shipbuilders published the figures of their savings. It was unquestionable that one of the greatest evolutions of modern industry would be connected with this development of the Diesel engine, and that Great Britain, as the greatest shipping nation of the world, would derive the greatest advantage from it.

DIESEL MARINE ENGINE EVOLUTION.

The first marine Diesel engine of 20 h.p., was constructed in 1902-3 in France, for use on a canal-boat, by the French engineers, Adrien Bochet and Frédéric Dyckhoff, in conjunction with the author. This engine had, like the Junkers engines hereafter mentioned, two pistons working in opposite directions in one cylinder, but the fly-wheel shaft was not at one end of the cylinder as in Junkers' engine, but traversed a cooled chamber passing straight through the combustion chamber. The engine worked on a four stroke cycle. The great feature of this arrangement was the very high speed which was made possible by the perfect balance. This small engine was, as stated, used to drive a canal-boat and worked quite satisfactorily. Others were also built in various sizes up to several hundreds of horse-power for some French submarines by Sautter, Harlé & Co., Paris. This type of engine was of no further practical interest to-day, but while its first application to a canal boat was of no importance in itself, it had at least the historical interest of being the first Diesel engine to be used on a boat. Since the date named the evolution of the Diesel marine engine had steadily continued, chiefly on the demand of the French submarines and Russian river boats. Later on the high speed four-stroke cycle engines, built for electric power stations, were made even lighter than before, and used for French submarines and for Russian river vessels. These engines were not originally reversible, on the contrary, they were used to generate electricity by means of which the propellers were driven indirectly for manœuvring. In the most favourable case (Delproposto) the propulsion of the vessel was performed directly by the engine, whilst the manœuvring and low driving were done by means of electricity. Dr. Diesel gave an illustration of an engine which had been worked originally, not only as a stationary, but also as a marine engine, although it was not really designed for marine purposes.

The first reversing marine two-stroke cycle Diesel engine was built in 1905 by Messrs. Sulzer Bros. at Winterthur. It was exhibited in 1906 at Milan and fitted to a vessel on Lake Geneva in the same year. At that time engineers were not quite clear as to the importance and value of the two-stroke cycle principle, and many firms went on trying for years to make the four-stroke cycle engine reversible. The first engine of this kind was built by Messrs. Nobel Bros. at St. Petersburg in the year 1908, and was fitted to a Russian submarine. This was a 120 h.p. three-cylinder engine, but great mechanical complications had been at first caused by the reversing of the four-stroke cycle engine. The problem had recently been solved in a much more simple and better way, in a six-cylinder 150-h.p. reversible four-stroke cycle engine of 350 revolutions, constructed in the year 1911 by the French firm, Messrs. Delaunay-Belleville. This engine is fitted with two air pumps, of which a spare one is for manœuvring.

In many factories reversible four-stroke cycle marine engines were still built, but, on the whole, engineers were, for navigation purposes, inclined to abandon the four-stroke cycle engine entirely and to replace it by the two-stroke cycle engine.

A small four-cylinder engine of 30 h.p. and 600 revolutions per minute was built for experimental purposes in the year 1909, after designs by the author, as an automobile engine for heavy loads, but it can also easily work as a marine engine. The cam-shaft is mounted on the cylinder-cover. This reversible four-stroke cycle engine was of historical value in so far as it illustrated the first attempt to construct the Diesel engine as an automobile engine for traction wagons, and no doubt in future years these experiments, carried out in some different way, would lead to satisfactory results.

Dr. Diesel referred to a quite new Sulzer six-cylinder marine engine working at 300 revolutions, in which an innovation was to be noted. The scavenging valves were not fitted on the top within the cover, but below in the scavenging air reservoir. Quite recently double-acting vertical two-stroke cycle Diesel engines had been built, and one of these double-acting two stroke cycle engines with one cylinder of 1,200 h.p. had been made by Messrs. Carels Frères, the results of the tests of which were as yet little known to the public. It was generally known, however, that in the Nürnberg works of the M.A.N. important experiments with double-acting two-stroke cycle engines were being carried out. In these works prolonged official tests of a three-cylinder double-acting two-cycle engine of 850 h.p. were made in August, 1911, and the results proved highly satisfactory. At the present time a double-acting two-cycle three-cylinder engine of 2,000 h.p. per cylinder was being tested at Nürnberg. The dimensions of these cylinders are as follows: Diameter, [illegible] mm. (31½ inches), stroke, 1,060 mm. (41¾ inches), revolutions per minute, 160.

The air supply pump for fuel injection is driven by a special Diesel engine, whilst the scavenging pumps are driven direct from the crankshaft.

If, as seems probable, these tests also give satisfactory results, the era of very large Diesel engines has begun, especially low-speed marine engines suitable for driving propellers. This last engine has already yielded considerably more than 2,000 h.p. per cylinder, so that an engine unit of this kind with six cylinders would give 15,000 h.p. or 45,000 h.p. for a vessel with three propellers. This kind of marine engine requires six cylinders to ensure a regular turning moment and balancing, so that the number of cylinders cannot be considered abnormally high ; on the contrary, it must be accepted as the most suitable and proper number. The opinion which was still prevalent some months ago, that about 1,000 h.p. per cylinder was the maximum for Diesel engines, has therefore been quickly overthrown by these facts, and it may be [illegible] that the [illegible] marine engine [illegible] at home. [illegible] Krupp's German Works [illegible] cylinder unit of [illegible] double-acting two-cycle were also being tested at [illegible] also at Sulzer's Works a [illegible] acting two-cycle cylinder of [illegible] h.p.

Junkers' system is used for vertical marine engines. This engine is built on the lines of the old Otechhauser gas engine with two pistons working in opposite directions in one cylinder, but acting on the Diesel principle.

From motives of prudence, the various navies which were now fitting some large warships with Diesel engines started with one Diesel only out of the two or three engines on board; the Diesel works alone when the ship is running at normal speed, but for high speed, steam is used as an auxiliary. It is evident that larger warships will not be fitted solely with Diesel engines until practical tests on the high seas have proved to be completely successful.

REVIEWS.

The Electric Propulsion of Ships. By H. M. Hobart, M.Inst. C.E. Price 5/ nett. London and New York: Messrs. Harper Bros.

This book of some 100 pages of letterpress and forty four illustrations has been written for the purpose of dealing with a subject to which the attention of engineers has been drawn of late years with increasing frequency *viz.*, the proposition of employing electrical apparatus as a component part of machinery for ship propulsion. While many plans have been proposed and wide differences of opinion have been held relative thereto the author is of opinion that such differences are largely due to the failure to recognise that while electrical methods may be advantageous for one ship and one set of conditions for obtaining commercial utility, the opposite may obtain under other circumstances. He boldly states that it is quite impossible to generalize to the extent of stating unqualifiedly that it is or is not commercially advantageous to incorporate electrical apparatus in the machinery employed for propelling. The electrical engineer must be naturally diffident in applying his land experience to ship propulsion, and cannot do more than place at the disposal of marine engineers and naval architects, the special knowledge he has acquired in applying electrical machinery to more or less remotely analogous propositions. The author has, by this book, provided a bridge over which the marine engineer can make incursions into the electrical engineer's territory and return to his marine engineering problems with a better comprehension of the reasons for the enthusiasm with which of late years the electrical engineer has regarded the probability that there is a legitimate and fairly wide field for electrical machinery as a component part of ship-propelling machinery. In treating the subject he has taken a comparative basis for the results from other systems of high-speed machinery and has drawn some extremely valuable and interesting deductions therefrom, quoting the views of eminent engineers and naval architects whose opinions carry a great weight with the members of both professions. He opens his subject proper with a chapter on the size and power of ships, and proceeds to deal with the energy per ton mile in propelling ships at constant speed, the frictional resistance and the momentum of ships, the speed and efficiency of propellers, the mechanical speed-reduction and electrical speed-reduction gearings for steam turbines, the use of superheated steam in marine engines, electrical gear as a means for improving the load factor, the internal combustion engine for ship propulsion, and alternating and continuous current for the same purpose. He then describes some systems of propelling ships electrically and concludes his work with three chapters dealing specifically with the Alter-phase, the Durtnall and the Emmet systems of ship propulsion, from the point of view of the special features in each system and the scope of the claims for novelty that are advanced in the matter of patent rights. The matter is methodically set out and the limitations between appropriate and inappropriate cases are defined, so that with the data at present in the hands of marine engineers, and with their close knowledge of detail considerations, the work should form a useful aid to enable them to more closely define the boundaries affecting the variety of conditions appertaining to the problem in question.

An Introduction to the Study of Fuel. By F. J. Brislee, D.Sc. London: Messrs. Constable & Co., Ltd. Price 8/6 nett.

The author in this book has combined the results of teaching with those of technical experience. The end sought has been to bridge the gap that exists between the ordinary elementary text books of chemistry and the large treatises dealing with fuel which enter into minute details of the chemical composition of fuels, the design of coke ovens and producers and other purely descriptive matter. In this direction the principles of fuel analysis and the methods of determining calorific power and of high temperatures has received considerable attention. A useful point for the reader is the prominence with which the reversibility of a chemical reaction and the conditions governing it have been pointed out, as well as the ideas of chemical equilibrium and reaction velocity. The reasons for the non attainment of equilibrium in technical practice have been outlined, while a few of the salient points in connection with solid fuel are presented without the reproduction of long lists of fuel analyses. The author has dealt with gaseous fuel at considerable length and the calculations of Jüptner have been included in order to illustrate the application of modern methods of physical chemistry to technical problems. It is satisfactory to note that the book is not overburdened with descriptions of coke-making and gas-producing plants, as much can be obtained from many of the treatises already published. A chapter is devoted to the consideration affecting the selection of plant to any given purpose, and of the importance of utilizing the waste heat contained in the products of combustion. Altogether the work should form a useful addition to the library of the engineer interested in this particular subject.

Internal Combustion Engines and Gas Producers. By C. W. Askling, M.E., and E. Roesler, M.E. London: Messrs. Charles Griffin & Co., Ltd. Price 12/6 nett.

This work is partly a translation and partly an adaptation of the original work on the same subject published in Sweden in 1909. The work has been divided into two distinct parts, that treating of producers being written by Mr. Roesler and that dealing with engines by Mr. C. W. Askling. A special point has been made in treating of cheap fuels for power purposes, and also the endeavour made to utilize for marine purposes the great advantages offered by internal combustion engines. A good deal of the matter dealt with is of an international character, and has a special value in arriving at some idea of what each nation has contributed toward the subject. The method of working of internal combustion engines, compared with that of other heat engines, is fully explained, and the production, preparation, composition and qualities of the fuels mostly employed in gas and oil engines is dealt with in detail. The description of producers with accessories, and the general principles of design, are included, as well as the general rules for the care of suction gas plants and the description of producer plants built for gas power purposes. The second part of the book comprises the principal power-cycles of internal combustion engines, and full descriptions of gas and oil engines. Further combustion, heat balance, cylinder dimensions, disturbance of working, measures of precaution and the working economy applicable to combustion engines are fully dealt with. In conclusion, some very interesting installations of plant on the Continent and the United States of America are described, with illustrations. The photographic records of explosion experiments given are of special value to the student in understanding the phenomenon.

Liquid Fuel and its Apparatus. By W. H. Booth. London: Messrs. Constable & Co., Ltd. Price 8/6.

In this volume we have, as its title implies, an account of the fuel that has come much into vogue of recent years for steam raising, and the apparatus employed. For marine work the Navy has been the great user, for reasons which are well understood. In oil-carrying vessels we have the same methods adopted, but in the ordinary way coal has not been displaced to any great extent. There is, for one reason, a difficulty of getting supplies of liquid fuel. Oil burning has been before the public, however, a good many years, and here we have what may be said to be a summary of the position to-day.

Liquid fuel, though theoretically of higher calorific value than coal, is not so easily handled. You require brickwork linings, for instance, to make it effective, and then there are so many varieties that the same apparatus cannot always

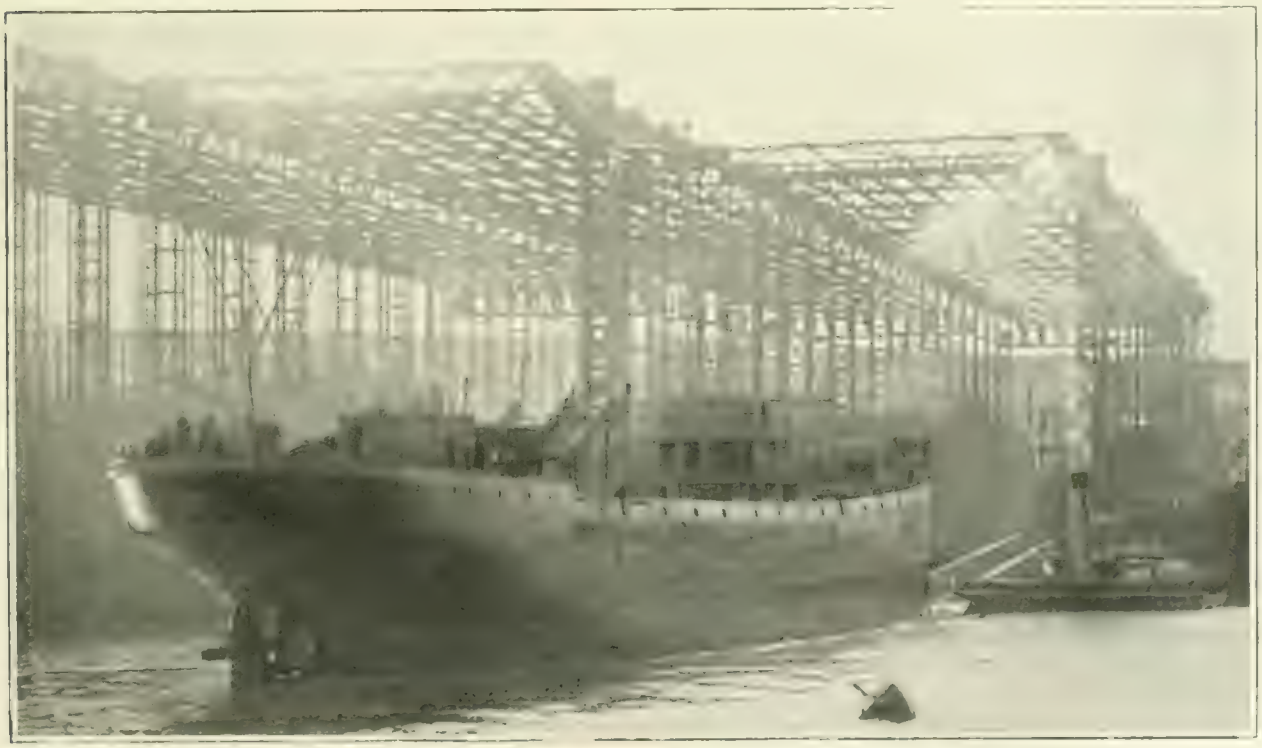
be used for operating. An atomizer is required for the heavy classes in all cases, to discharge the oil into the furnace and mix it with air. With the lighter oils the process is different. Vaporization is effected by passing the liquid fuel through a coil of pipe heated by the flame itself. The different varieties of fuel are noted here, which enables a judgment to be formed as to their values. A trouble with this class of fuel is that it is often found mixed with water, thus depreciating its value. For marine purposes the question of oil fuel at sea is prominent, and the arrangement and apparatus employed. The various burners used are found in full detail. It is scarcely necessary to enumerate these as they are fairly well known. An important feature of this system is, perhaps, the relative merits of air and steam atomization. The difference is given here as *nil*. It is clear that the form of atomizer is important, and as to detail the author is very complete, with the many systems on the market. To anyone wishing to make a study of the subject, all desirable information will be found available here first hand, and at the present time the subject is naturally of special value.

CIRCULATORS (ROSS SCHOFIELD SYSTEM), of 117 and 118, Leadenhall Street, London, E.C., have recently completed the fitting of their system of circulation in the following steamers: *Cedric*, forty furnaces; *Mesaba*, six furnaces; *Irishman*, fourteen furnaces; and *Zeeland*, thirty-two furnaces. Their system will be adopted in the following vessels now building: Two steamers for the Leyland Line, one building at Scott's Co., Greenock, and one at Messrs. D. & W. Henderson & Co., Ltd., Glasgow, one steamer for the British India Co., building at Messrs. Denny & Co., Dumbarton, a White Star Line vessel building at Messrs. Harland & Wolff, Ltd.; two vessels for Messrs. W. Corry & Son, Ltd., London, building at Sunderland; two vessels for St. Petersburg and two for Germany, building at Palmers' Shipbuilding and Iron Co., Ltd., Jarrow. The s.s. *Brighton Queen*, for Messrs. Campbell & Co., Bristol, and two tugs for the Gloucester Dock Co., will be similarly fitted.

THE "HERMAN SAUBER."

Self-Trimming Collier.

Messrs. William Doxford & Sons, Ltd., Pallion, launched from their yard on the 29th February the s.s. *Herman Sauber*, a specially designed self-trimming collier, with mechanical discharge. The vessel is 315 feet long by 43½ feet broad and 23 feet deep, and is built to the British Corporation and Germanischer Lloyd's Classification. The vessel carries 3,750 tons on 18 feet draught; steams 10 knots, and is fitted by the builders with their triple-expansion engines and Howden's forced draught boilers, bronze propeller, and other modern improvements. There are nine hatches, 33 feet wide and 16 feet fore and aft, leaving a minimum of deck space and allowing of the whole of the cargo being teemed and self-trimmed. The chief point in the vessel's design is the discharging gear, and the construction is such that the cargo can be discharged at the rate of 800 tons per hour, or allowing for barge changing, at 600 tons per hour, and the whole cargo can be finished in six hours, employing only six men. The economy in labour and time is seen by a comparison with the record for similar work by the most modern carriers with derricks and winches, which is about 300 tons per hour with 112 men. The steamer has been built to the order of Messrs. Sauber Bros., of Hamburg, and will run in their Hamburg trade. At the launch the owners were represented by their English agents, Messrs. T. H. Catcheside & Co., of Newcastle, and the vessel was christened by Mrs. Howard Catcheside.



The *Herman Sauber*, a specially designed self-trimming collier, built by Messrs. Wm. Doxford & Sons, Ltd., Pallion, for Messrs. Sauber Bros., of Hamburg, and launched 29th February.

ANSWERS TO CORRESPONDENTS.

H. V. *Can you give me any information as to joining the Royal Australian Navy? I hold a commission as Chief Engineer in the Naval Volunteers and also possess a B.O.T. Certificate as Chief Engineer and Second South Kensington Certificates in Marine Construction, etc.*

A limited number of Engineering Graduates of Australian birth from the Australian Universities, are to be entered each year until such time as Engineer Officers entered in the Royal Australian Naval College as Cadets become available for sea service. Engineer Officer vacancies in the Royal Australian Navy will, as a rule, be filled by the loan of Engineer-Officers from the Royal Navy and it is anticipated that only very few if any engineers will be entered from any other source.

A. H. O. *Can you recommend the name of a text book published cost [illegible] from which one can derive an idea of estimating cost of material, labour, etc., for shipbuilding. Failing this can you give me an idea of how estimates are prepared?*

We do not know of any book published exactly fulfilling what we conceive to be our correspondent's requirements, nor do we think any such book would find much of a market. Its utility would be very questionable, because, as our correspondent must surely suspect, the mode of estimating the cost of material, labour, etc., for ships, varies with every district, and almost with every firm and individual—also, of course, according to the class of shipping and the character of owner involved. No such thing as a fixed or standard mode of computing the cost of material and labour exists, but there are many ways of approximating to it through the use of a co-efficient, based on actual individual experience. We are afraid no one has thought it worth while to build a book on the subject, but our correspondent might gather some crumbs of what he is in quest of from a little book recently published by Messrs. Frazer, Asher & Co., Ltd., 164, Howard Street, Glasgow, entitled :—"Marine Engineering Estimates and Costs." It is by Mr. C. R. Bruce, M.I.N.A., M.I.E.S., and according to its sub-title it is "for those engaged in the technical and commercial sides of engineering and shipbuilding." Such excerpts from the table of contents as "The inquiry and specification"; "the agreement or contract"; "the division of work between machinery and hull"; "a standard estimate"; "engine rough weights and wages"; "boiler rough weights and wages", "establishment charges," would indicate that the subject is treated in some way to meet our correspondent.

Referring particularly to the second sentence in the query, after what has been said above it will be understood that any guidance we could give would be on points so general that its value would be more questionable the more detailed it was. With a plain-going specification, having no fancy fal-lals, or out-of-the-way touches or items, the work and responsibility of estimating is of course lessened. Otherwise, quotations and prices from sub-contractors and makers of specialities form a laborious bit of work. Roughly speaking, and in general cases, the items of estimate can be grouped and accounted for without much particularization. The major items are, of course, the plates, angles or other sectional material, forgings, castings, rivets, bolts, anchors and chains then timber, cement, paint, etc., together with all that is involved in the terms "carpenter work," "joiner work," "plumber work," "paint work," "upholstering work," etc. Deck machinery, such as windlass, winches, cranes, steering gear, etc., are usually included in the estimate for hull work. Propelling machinery and boiler and engine-room auxiliaries are of course embraced in the engineering estimate, with which the shipbuilder has not intimately, or in detail, to concern himself. The last thing falling to be mentioned is the question of labour and this is perhaps the most ticklish and risky item of all to compute. It, of course, varies with the district, with the character of the contract, and too often with the class of workers the estimating firm has to deal with. Hard experience is here the only safe guid

Collapse of a Quay. Owing to the subsidence of the ground, due probably to dredging operations and gradual washing away of the bank, a large portion of the quay at the premises of the Thames Iron Works, with scant warning, collapsed, and fell into the creek. The large shear legs, about 90 feet high, situated near, were also in danger of falling, and as this also rendered the passage of vessels unsafe, the navigation to and fro in the creek was stopped. As it was impossible to prevent the fall of the heavy shear legs, it was necessary to direct the course of the fall into the water, and if possible during flood tide; steps were taken to burn the legs at the quay and so place the structure that when it fell as little damage as possible might result. This was accomplished later in the evening. The shear legs are now being hauled up the slipway.

The Submarine Signal Company have now 138 signal stations and 805 ships equipped with their apparatus.

Hamburg-American Line's Mammoth Vessel.—The construction of the *Imperator* is proceeding very rapidly and it is expected that the vessel will be ready for launching in a few months unless some unforeseen event occur.

Institution of Civil Engineers.—It is announced that the 20th "James Forrest" lecture will be delivered at the Institution on April 19th at 9 p.m. by Mr. H. R. Arnulph Mallock, F.R.S., his subject being "Aerial Flight."

Within a fortnight, Messrs. James Pollock, Sons & Co. ran the trial trips of fourteen tugs. The tugs are for various parts of the world, and included a paddle and three motor tugs.

N.E.C. Institute of Engineers and Shipbuilders.—By the courtesy of Messrs. Smith's Dock Co., Ltd., the Graduates of the Institution paid a visit on the 10th of last month to the New Graving Dock No. 6, now under construction at Messrs. Smith's Dock Co.'s North Shields Yard.

Messrs. Thornycroft have just completed and delivered to the Algeciras Railway Company a twin-screw motor-launch *Violeta*, which is to be added to the Company's existing fleet connecting Algeciras with Gibraltar, a distance of about 10 miles. The vessel is 66 ft. long overall, 12 ft. beam, and 8 ft. moulded depth. The propelling machinery consists of two six-cylinder "Thornycroft" C-type petrol-paraffin engines, running on the four-cycle principle, each developing 80 h.p. on petrol and 70 h.p. on paraffin fuel.

British Corporation Classification Society.—With the completion of twenty-one years of active work and progress, this Society has now found it necessary to extend its arm to embrace a wider sphere of influence, and after the annual meeting recently held at Glasgow, it was decided to establish a committee at Liverpool. The tonnage which has been classed under the British Corporation since its inception was stated to be 3,000,000 tons, while nearly 500,000 tons were then under construction. The Liverpool committee, with Sir Percy E. Bates as chairman, and Mr. Edmund Johnstone vice-chairman, are Messrs. A. Grayson, A. C. F. Henderson, C. Livingston and A. H. Read. The chairman of the society, whose head office is in Glasgow, is Mr. Robert Clark, in succession to Mr. Francis Henderson.

Portable Vice.—Our attention has been called to a handy vice which can be made to serve in many ways more conveniently than the ordinary fixed or portable bench vice, in that it can be carried readily and fixed up on a beam, rail or bench as desired, at the nearest point to the work which requires to be dealt with, stripping brasses, etc. For service in overhauling deck machinery, winches, etc., it is peculiarly suitable.

Industrial and Trade Notes.

THE CLYDE AND SCOTLAND.

(*From our Own Correspondent.*)

Clydebank Shipyard and Naval Work.—Transcending in marked degree anything in the way of contracts booked since last month's notes were penned, is the order secured by Messrs. John Brown & Co., Ltd., for a new battleship—or "battle-cruiser"—of the "Lion" type for the British Admiralty. The contract is for hull and machinery, and it is understood the vessel will be the biggest, the fastest, and the most powerful armed vessel of her type in the world, and that her cost will run to over two millions sterling. With the Cunarder *Aquitania* and this superb battle-cruiser on the stocks, the turbines for the *Queen Mary* being built at Jarrow completing in the shops, and the Australian battle-cruiser *Australia*, the protected cruiser *Southampton* fitting out in the Company's basin, Clydebank will now be engaged in as important naval and mercantile shipbuilding as any concern in the world. This is further emphasized by the fact that the Company have recently been entrusted with the contract for the turbines of one of the two Chilian battleships which have been ordered from Messrs. Sir W. G. Armstrong, Whitworth & Co., Elswick. The displacement of the vessels will be about 23,000 tons, and there will be four turbines, two of the Brown-Curtis and two of the Parsons type, driving four lines of shafts, and the total shaft horse-power developed, about 37,000, is expected to produce a speed of about 22 knots.

Messrs. Wm. Denny & Bros., Dumbarton, have been commissioned by Messrs. P. Henderson & Co., Glasgow, to build, and Messrs. Denny & Co. to engine, a new steamer for their Glasgow, Liverpool and Rangoon trade. The new vessel will carry about 8,500 tons deadweight, and will have accommodation for about 100 passengers.

Messrs. A. McMillan & Son, Dumbarton, are understood to have received from the Stoomvaart Maatschappij Nederland of Amsterdam an order to construct a large steamer for the passenger, pilgrim and cargo trade, of about 9,000 tons, similar to one ordered, as afterwards noted, from Messrs. Hamilton & Co., Port Glasgow.

Messrs. Wm. Hamilton & Co., Ltd., Port Glasgow, have contracted to build, for the passenger pilgrim and cargo trade of the Stoomvaart Maatschappij Nederland, Amsterdam, a steamer of 451 ft. length between perpendiculars. Engines to give the vessel a speed of 13½ knots in service will be supplied by Messrs. David Rowan & Son, Glasgow. This is the fifth order which Messrs. Hamilton & Co. have received from the same owners.

The Greenock and Grangemouth Dockyard Company, Ltd., Greenock, have received orders to build two large oil tank steamers, one for the Deutsch Amerikanische Petroleum Gesellschaft, of Hamburg, and the other for Glasgow account. Each of the vessels is to carry 6,500 tons, and they are to be built to a first-class specification, a part of the equipment of the vessels being oil-fuel burning installations. The machinery for both vessels will be supplied by Messrs. Rankin and Blackmore, Greenock.

Messrs. Ferguson Brothers, Port Glasgow, have contracted to build and equip with the requisite machinery a large and powerful bucket dredger for the Blyth Harbour Commissioners. The firm have also received an order for a powerful tug steamer for London owners.

Ship Lengthening.—Messrs. Alexander Stephen & Sons, Ltd., Linthouse, have booked a contract which if it does not exactly represent new shipbuilding, is, from a technical standpoint, of equal interest and importance. They have been commissioned by Messrs. George Thompson & Co., of the Aberdeen White Star Line, to lengthen their steamers *Morayshire* and *Midlothian* by 50 ft. amidships, and to reconstruct the arrangement and fittings of the passenger and cargo spaces, which will be necessary as a result of the lengthening. In order to have facilities for carrying on this somewhat special work—more common some years ago than it is to-day, when rapidity and economy of constructing new ships from the foundation are so comparatively perfect—Messrs. Stephen have obtained from the Clyde Trustees the continuous use of one of their graving docks from June 10th next till about the end of October, the period over which they expect the work will extend. The two vessels which are to undergo the interesting process of lengthening were built at Linthouse in 1903 for the London, South African and Australian trade of Messrs. Thompson's Aberdeen Line, and are twin-screw vessels of 6,705 tons gross and 455 ft. in length. When they were built they were the largest vessels in the Company's fleet and were considered quite large enough for the service. Last year, however, the *Dunottar Castle* and the *Edinburgh Castle* liners of 11,200 tons gross, were built at Belfast for the same service, and the steady increase in the trade requires also the increased carrying capacity represented by the alterations which are now to be carried out. The precise way in which these will be carried out, and their technical and commercial effects, form a subject which will by and by, be fully treated in the "Marine Engineer and Naval Architect."

Electric Steering Gears.—Messrs. John Hastie & Co., Kilblain Engine Works, Greenock, whose steering gears, both steam and hand, for all classes and sizes of vessels, have for many years held such high repute, still find orders plentiful for various types of gear. They are now, however, beginning to specialize in the Hele-Shaw Martineau electric steering gear, which has attracted such interest in the proceedings of the professional societies of late, and which, as fitted in the motor ship *Selandia*, has secured the attention of so many of those responsible for the practical value and efficiency of new departures in ship outfit. In addition to the gear fitted in the *Selandia*, and now being fitted into the sister-ship built at Messrs. Burmeister & Wain's, Copenhagen, and the *Jutlandia* just completing by Messrs. Barclay Curle & Co., on the Clyde, the Greenock firm have now on order two additional sets for Deisel-engine vessels, building at the Copenhagen Company's works. This goes to show the favourable impression which the gear on board the *Selandia* has created through its working in actual service. But, besides the installations in motor propelled vessels, there is another installation to point to on board an ordinarily propelled steamship, which has amply demonstrated the success and value of the electric gear. The Orient Line steamer *Orama* on board which is an alternative or auxiliary gear of the type, recently returned from her first voyage to Australia, and the gear was opened up for inspection at Tilbury Dock. The huge liner was steered by the electric gear for over 21,000 miles, and no hitch of any kind took place. It was found, on examination, that this long and severe service at sea had not impaired the gear in any way, and it was replaced without alteration or adjustment of any kind. Careful readings of the Ammeter were taken while the ship was at sea, and it was found that the average power required for steering was 2·67 H.P. Considering the size and speed of the *Orama* it will be readily understood that this very moderate drain upon the motive power on board over such a lengthened voyage represents a very great saving over any form of steam-steering gear in existence, or, indeed possible. There can be little doubt whatever that the Hele-Shaw Martineau electric steering gear as made by Messrs. Hastie & Co., will soon approve itself to shipowners generally as an excellent investment.

The Caledon Shipbuilding Co., Dundee, have been commissioned by Messrs. James Currie & Co., Leith, to build and engine a high-class cargo steamer, 230 ft. in length, 35 ft. 6 in. in breadth and 20 ft. 6 in. in depth to main deck. She will be of the shelter deck type and will have a sea speed of fully 11½ knots.

The Rose Steel Foundry and Engineering Co., Inverness, who launched on March 2nd their tenth steam drifter, of 85 ft. length and 15 ft. beam, have on hand the building of three drifters of about the same dimensions.

Clyde Shipyard Proprietary Changes and Extensions.—Three highly-important shipyard absorptions have recently taken place on the Clyde. Two of them were concerned with upper-reach establishments, and the third was that of a Best Glasgow shipyard. Of the upper-reach establishments the first relates to the shipbuilding works and the engine and boiler works belonging to the London and Glasgow Engineering and Iron Shipbuilding Co., the two branches being at Govan and at Stobcross respectively, the purchasers being Messrs. Harland & Wolff, Ltd., of Belfast. The other case is that of the shipyard, graving dock and repairing works of Messrs.

John Shearer & Co., Ltd., Helensburgh, which have been purchased by Messrs. Barclay, Curle & Co., Ltd., Whiteinch and Finnieston. The third case of Clyde shipyard absorption is that of the purchase by Messrs. Russell & Co., Port Glasgow, of the shipbuilding, dry-docking and repairing business carried on by Messrs. A. Rodger & Co. of the same town.

TYNESIDE AND WEARSIDE.

(From our Own Correspondent.)

Tyneside.

WORK in all the yards and engineering shops up and down the Tyne continues very brisk although the coal strike is interfering with the delivery of material to the various works and several firms have already given notice to their employés.

Messrs. Palmer's Shipbuilding and Iron Co.—The battleship-cruiser *Queen Mary* was launched on the 20th of March by Lady Allendale. This vessel is the most powerful battleship-cruiser afloat.

Messrs. Sir Wm. Armstrong, Whitworth & Co., Ltd.—This firm still continue to be busy and have work, including three large oil steamships, to last them several months.

Messrs. Swan, Hunter & Wigham Richardson, Ltd., Wallsend-on-Tyne, have in hand three floating docks and three ocean-going destroyers for the Admiralty, a floating dock for a Colonial Government, several passenger steamers and cargo boats, and some large vessels for carrying oil in bulk. A new departure has been made in establishing a brass foundry and a coppersmith's shop.

The Northumberland Shipbuilding Co., Ltd., have a large amount of work in hand, in fact enough to last them for a considerable time, being engaged on several cargo vessels and other work.

Messrs. Wood, Skinner & Co., Ltd.—The work in this yard continues to be in full swing, the firm having enough work on hand to last them well into the next year.

Wearside.

Work continues to be very brisk in all the yards and engineering works on the river, although the firms are experiencing great difficulty in getting material delivered, and if the coal strike continues work will be delayed very seriously, in fact, a large number of hands are being paid off in various works.

Messrs. Wm. Doxford & Sons, Ltd., are still very busy, having three large oil steamships and other ships, among which is a collier, fitted with Doxfords' patent mechanical discharge, for discharging coal at the rate of 800 tons per hour by conveyors into barges, the coal being weighed automatically during the discharge.

Messrs. T. W. Greenwell & Co., Ltd., South Dock, after keen competition among the ship-repairing firms on the North-east Coast, including Hull, Leith and Dundee, secured the tender for repairing the s.s. *Headland*, which was ashore in the Black Sea, and was placed in the river Wear Commissioners' dry dock for survey and tenders. As nearly the whole of the bottom will have to come out, the vessel will be in the hands of the firm for from five to six weeks.

Messrs. J. L. Thompson & Sons, Ltd., are building a number of steamers for various firms, and are fully employed on all their berths at both the North Sands and Manor Quay yards.

Messrs. Osbourne, Graham & Co., Ltd., Hylton, continue to be busy with old and new work, and have enough work to keep them going for some months to come.

Messrs. George Clark & Sons, Ltd., have a number of sets of engines on order for ships building on the river and at other places, and are fully employed on new and repair work.

Messrs. MacColl & Pollock are still busy on sets of engines for various firms, both local and abroad, and in addition have two steamers at the quay for thorough overhaul.

Messrs. Lindsay, Carverhill & Co., the Wear Engine Works, have just despatched for service on a vessel to the order of the British Admiralty two of their 5-in. "Wear" oil motor-driven centrifugal pumps. These pumps are direct coupled in each case to a three cylinder paraffin motor of the four cycle type and have a suction lift of 24 feet. The pumps are tin lined for pumping fresh water, and can be used for this purpose or for salvage work as required. The firm have also in hand an order from the Admiralty for one of their 12 in. "Wear" oil motor driven centrifugal pumps for salvage work. This pump will be direct coupled to a four-cylinder motor, consuming paraffin fuel.

Messrs. S. P. Austin & Son, Ltd., have the new steamer *Melton* lying at their quay completed; she has been built for the Denaby and Cadeby Main Collieries, Ltd., to load at Hull, but owing to the coal strike she will be laid up at the builders' yard for the present. Another collier steamer building for a local company is plated and being made ready for launching in the coming month. Frames are being put up for a similar steamer for the coal trade, but the miners' strike has prevented the delivery of material for two large collier steamers to follow. Work has been carried out without interruption in this yard, both at shipbuilding and ship repairing, owing to the preparation which was made in storing coal in anticipation of a shortage. The docks have been exceedingly busy, owners taking advantage of the unemployment to have their vessels repaired, the docks not having been empty for some weeks. There are at present the steamers *Glenroy* and *Gregynog* undergoing Lloyd's special surveys; steamer *T. G. Hutton* with bottom plating damaged, and other vessels have been booked for the docks.

THE TEES AND HARTLEPOOLS.

(From our Own Correspondent.)

Middlesbrough.

Messrs. Sir Raylton Dixon & Co., Ltd., continue to be very busy; they are reported to have booked an order to build a large cargo steamer for Liverpool owners.

Messrs. W. Harkess & Sons, Ltd., are still busy and it is rumoured that they have booked an order for a small steamer for early delivery.

Messrs. Smith's Dry Dock Co., South Bank, continue busy in their repair department, and have booked an order to build a large steamer. They have placed the order for the machinery with local builders, as they have so much work on hand.

Messrs. Richardsons, Westgarth & Co., Ltd., are full up in all departments, and are reported to have leased a portion of their stock yard to a syndicate for the manufacture of heavy stampings; they have secured the contract to supply the machinery of about 800 i.h.p. with cylinders 19 in., 31 in., 51 in. and 36 in. stroke for Messrs. Smith's Dry Dock Co., previously mentioned.

Stockton and Thornaby.

Messrs. Craig, Taylor & Co. are well booked up with orders.

Messrs. R. Ropner & Sons, Messrs. Blair & Co., and Messrs. Richardson, Duck & Co. are all well booked up with orders, but at the time of going to press are expected to close down owing to want of material and coal.

The s.s. *Cedargrove*, of 2,371 gross tons, at present lying in the Tees, is reported as sold by the Steamship Navigation Co., Ltd., of Glasgow, to Mr. P. A. Welin, Stockholm, for about £29,000.

West Hartlepool.

Messrs. W. Gray & Co. continue to be very busy; they have a large amount of work on hand, which has been very much interfered with by the coal strike. They have a large repair job on for one of the Harrison boats of London, and have recently sold the s.s. *Fernley* of 3,820 gross tons to British buyers.

Messrs. Irvine's Shipbuilding and Dry Dock Co., Harbour Dockyard, have just launched a steamer for Messrs. Hyens and Co., Belfast, and are busy in all departments.

At the new entrance to the West Hartlepool approach to the docks, the contractors have hired Messrs. Swan, Hunter and Wigham Richardson's floating Titan crane for pulling out the piles at the entrance which is causing great interest.

The s.s.'s *Annette Furness* and *Lady Furness*, owned by the Furness, Withy & Co., Ltd., are reported as sold to Messrs. C. Ford & Co., of West Hartlepool.

Hartlepool.

Messrs. Irvine's Shipbuilding and Dry Dock Co., Ltd., continue to be busy, but are hampered for want of material; they are reported as having booked an order for Liverpool owners.

The Central Marine Engine Works of Messrs. W. Gray and Co. are very busy, but at the time of going to press expect to close down for want of coal.

Messrs. Richardsons, Westgarth & Co. continue to be busy in all departments; they have secured the contract to supply the machinery for a cargo steamer to be built by Sir Jas. Laing & Son, Sunderland, for Messrs. Lounden, of Liverpool.

THE HUMBER AND DISTRICT.

(From our Own Correspondent.)

New Fish Dock for Grimsby. As the result of a deputation headed by Sir George Doughty, M.P., for Grimsby, which waited upon Sir Alexander Henderson, chairman of the Great Central Railway Company, in the London offices, the Company has offered to build a new fish dock of about 22 acres. This will be double the acreage of the two fishing docks. The scheme will also include floating docks and the extension of the present market accommodation to the extent of about half a mile. The total cost is estimated at half a million. The extension will take in that portion of tide-covered land known as Campbell's Jetty.

Grimsby Shipping.—Owing to the coal strike the owners of trawlers have not been able to run their boats, cost of bunker coal being so high. At the time of writing over 125 trawlers are tied up in the docks, and with an average of a crew of nine this makes a total of 1,125 fishermen put out of work. There are hundreds of others connected with the docks similarly placed.

Hull Shipping. Hull has felt the pinch of the coal strike very keenly; this port has an extensive coal carrying trade to all parts of the world, and consequently there are hundreds of coal trimmers idle. Local steamers have been curtailed for the want of coal, and general cargoes and several oil mills have had to come to a stop. A large number of trawlers are also laid up in the fish dock.

Messrs. Earle's Shipbuilding and Engineering Co., Ltd., are fairly busy with new and repair work. The new ferry steamer built for the Great Central Railway Company to ply between Hull and New Holland on the Humber is ready for her trial trips, and the other new boat will soon follow. These two ferry steamers will be a great advantage to the Hull and Lincolnshire passengers, especially to Grimsby, as they will be able to cross over the banks on the river and are a very great improvement on the old class of steamers. The firm has been successful in obtaining the contract for building a large passenger and cargo steamer for Holland owners. The s.s. *Bradford City* has completed extensive repairs, and the R.M.S. Finnish liner *Arcturius* is now undergoing extensive ship repairs, having new boilers fitted. The prospects of this firm are now very good.

The Hull Central Dry Dock and Engineering Co., Ltd., have been very busy during the past month, and the weekly wage account now paid has been rarely exceeded. The Central Dry Dock has been occupied without the loss of a single tide, and another public dock has been engaged by the firm for the whole month, and a third graving dock for half a month. The amount of work done is very much beyond the average and work afloat has also been plentiful. At the time of writing a good reserve of coal is on hand, and no difficulty is anticipated in dealing with business.

The North-East Coast Engineering Works, Ltd., are still keeping fairly busy. The following steamers have been under repair during the month: S.S. *Caribbean*, S.S. *Agnes*, S.S. *Hessle*, S.S. *Linaria*, French sailer *Clémentine*, and tug *Wrestler*. The steamer *Hessle* is now undergoing No. 3 special survey, and opening out for Lloyd's; the vessel is also having several plates renewed in her bottom. The s.s. *Linaria* is undergoing extensive damage repairs in graving dock; several frames are being renewed and shell plates faired and renewed. This firm is up-to-date and promises prompt despatch of orders placed with them.

Messrs. C. D. Holmes & Co., Ltd., have completed the boilers and machinery of four new trawlers this month, and after running trial trips the vessels have been handed over to the owners. Several new vessels are fitting out at the present time. The work are very busy erecting engines and boilers and all machines are working at full pressure in the shops. The Company are also building the patent compound type of steam trawler, and the auxiliary engine.

Messrs. Cooper & Co., Ltd., are exceedingly busy in all their departments, both on outside and local business. They have docked the *Blackburn* and *Hessle* for extensive overhaul. The amount of business has also necessitated their engaging the public graving docks for other vessels. The moulding and pattern shops are fully employed on work for outside firms as well as their own work. Several orders from British and Continental firms for Cooper's patent propeller have been received.

Thomas Tate have plenty of repair work on hand and have fitted a new stern post and new boiler on the steam keel *Lincoln*. The s.s.s. *Lordsmark* and *Lincoln* have undergone deck and engine room repairs, and similar repairs have been effected on several coasting steamers. The machinery of a number of local tugs has been opened out for survey.

Messrs. Amos & Smith are still working at full pressure, and have sufficient orders to keep them busy all the year in trawlers, boilers and machinery, besides building for local owners. The branch engine shop at Alexandra Dock is kept fully employed at the graving dock, and on steamers alongside opening out for surveys, etc., and general overhauling. The outside staff at the West Docks are very busy on repair work.

Messrs. Stewart & Craig, engineers and boilermakers, have been executing repairs, and some of them very extensive, on the following vessels: S.S. *Cramer*, S.S. *Marmi*, S.S. *Gilgal*, S.S. *Geraldo*, S.S. *Machine*, S.S. *Lou*, S.S. *Lou*, S.S. *Premier*, and have booked several large steamers coming to this port for repairs. Ship owners can depend on this firm for prompt despatch of any repair work entrusted to them.

Messrs. Woodall & Co., engineers and boilermakers, are still very busy; they have had the following steamers in for repairs: S.S. *Nerine*, S.S. *Hiram*, S.S. *Lou*, S.S. *Shield*, S.S. *Hilston*, and the sailing ship *Doris*. Several orders have been received from Earle's Shipbuilding Co., Ltd., to supply the firm's patent Hundibloos for the new Wilson lines. Stern post forgings have also been supplied to several small shipyards.

Fish Dock.—The fitting and repairing shops in all branches connected with steam trawlers are fully employed, the owners taking the advantage of the steamers being laid up through the coal strike of overhauling the vessels and putting them through the yearly surveys, etc. The patent lift belonging to the railway company at the dock is kept engaged drawing tail shafts, surveying and painting hulls, etc.

Messrs. Cochrane & Sons are still very busy, and will be to the end of the year with trawlers, coasting steamers for local and other owners. They launched the steam trawler *Falmouth* the other day for Brixham, she will be fitted with the latest appliances and improvements for the fishing trade. The boiler and engines are by Messrs. C. D. Holmes and Co., of Hull. Several other boats are about ready for launching.

Messrs. Cook, Welton & Gemmell are keeping busy, and have launched several trawlers during last month. The *Nomes* is now fitting out at Hull, the engines and boiler are by Messrs. C. D. Holmes & Co. The dimensions are: length, [illegible] ft., beam, [illegible] ft., depth [illegible] ft. [illegible] Shed built to the order of Messrs. Robertson & Railton, of Grimsby, are to Lloyd's requirements.

SOUTH OF ENGLAND AND ISLE OF WIGHT.

(From our Own Correspondent.)

The Rival Unions.—On several occasions lately there has been trouble at Southampton Docks on sailing days due to Union men in the docks refusing to sail at the last moment owing to the [illegible] non-Union men thereby causing much delay. [illegible] have in the past been settled among the men, and generally the vessel has sailed with Union crew. Another aspect of the trouble [illegible] into prominence [illegible] the refusal of [illegible] to the British Seafarers' Union, coupled with [illegible] the National Sailors and Firemen's Union in consequence of the action of London officials of the latter [illegible] with a

Southampton man who was a member of the former. The only Union as far as sailors and firemen are concerned recognised by the employers here is the British Seafarers' Union, so that this phase of the matter is not likely to assume serious proportions at Southampton.

"Olympic" - "Hawke" Collision. As mentioned in last month's "Facts of the Mail Lines" a portion of the *Hawke's* bow has been brought to the surface. The part recovered weighs about 7½ tons and was found at a depth of about 80 ft. in a position about 150 yards from that at which the Captain of the *Olympic* stated the collision occurred. This spot was about a quarter of a mile north of the position as fixed by the Captain of the *Hawke*.

Messrs. Day, Summers & Co., Ltd., Northam Iron Works, Southampton. This firm are busy carrying out extensive structural alterations to the passenger and cargo vessels, *Kelvin Sovereign* and *Ovar*, of about 1000 tons, which have recently been purchased by Brazilian owners. On the completion of the work the vessels will proceed to South America. Extensive repairs have also been completed on the Swedish steamer *Atlantic*, which was damaged in the recent gales owing to the shifting of the cargo. The tug boat *Don Roberto* to the order of the Liebig's Extract of Meat Co., sailed on the 16th of last month for South America. The s.s. *Mariosa* which has been at the yard for overhaul, etc., left for a Mediterranean cruise about the middle of last month.

The Isle of Wight Steam Packet Co.'s P.S.'s *Princess Mary* and *Stirling Castle* are on the slips for their annual fit out, and a new paddle shaft is being fitted to the same Company's *Princess Beatrice*.

Messrs. J. Samuel White & Co., Ltd., East Cowes, I. of W.—Several motor and special service launches have been delivered for the Premier Service, as well as a number of small craft during last month. A repeat order was despatched to the China Station and a launch for Trinity House will shortly be handed over. Good progress has been made with the Chilian destroyers, London County Council fire float and other work. All departments continue busy.

Messrs. Simpson, Strickland & Co., Ltd., Dartmouth, S. Devon.—All departments continue fairly busy and a good deal of new and repair work is in hand. Boats now building include a 40-ft. cabin cruising motor yacht for a member of the British Motor Boat Club. She will be fitted with a 4-cylinder 32 b.h.p. petrol engine of the firm's own manufacture. A 48½ ft. teak cabin launch is in hand for a South Devon owner, and will be fitted with a triple engine and water tube boiler. The whole of the machinery and steel work for a 65 ft. composite tug boat to be completed abroad is in hand. A 33-ft. motor launch with Kelvin motor for Torquay. A 50-ft. steel decked launch with compound non-condensing machinery and return tube boiler for London owners and a 39-ft. steel launch for the Danube are in hand, also a 35-ft. motor launch for the Admiralty. The firm are also building a fair sized triple-expansion engine for the University of Queensland, for instructional purposes in Brisbane College.

Messrs. J. I. Thornycroft & Co., Ltd., Woolston Works, Southampton.—Good progress is being made with the four torpedo-boat destroyers on order for the British Admiralty, and the keels of two were laid last month. The shell plating of the two Admiralty tugs is almost completed. The shipment of the armoured motor patrol boats to Turkey has been suspended during the continuance of the Turco-Italian war. A repeat order for a 100-ton lighter for the Crown Agents for the Colonies was shipped to Uganda last month. The 50-ft. motor launch ran successful trials and was shipped about the beginning of March. The usual amount of general work has gone through the shops, and the repairs department has been busy with work on troopships, yachts and dockyard craft. H.M. ships *Halcyon* and *Harlequin* have just been placed in the firm's hands for extensive repairs and renewals.

THAMES.

(From our Own Correspondent.)

Thames Ironworks Co.—This firm still looms largely before the public eye, but there is still no really definite information to give as regards the Government order. There has been an application to the Courts by the receiver as to whether he could borrow to complete contracts with the Turkish Government for building three steamers at £20,000 each; this the Court would not permit, as being possibly detrimental to the interests of the debenture holders. This means that one steamer which was plated and the two others framed and partly plated will remain standing as they are with such protection as is possible under the circumstances. Meantime no effort has been spared to bring matters to a head and secure the order for the cruiser. The 15th of March was the date given by the Admiralty for allotting the contracts but this has been prolonged. A holder of debentures has written to the daily press that there is an offer before the Courts to purchase the concern for £300,000, and he for one is not prepared to let such an opportunity pass by. Mr. Hills, however, considers this an inadequate price, and a drawback has ensued. The Company ask £300,000 each for the cruisers and the Admiralty offer is £280,000 only. Later information to hand shows that the two cruisers will be built in the Royal Dockyards. The shareholders do not seem willing to contribute 5s., say, in the pound to enable the business to be carried on, and the position rests there as we go to press. The *Thunderer* has passed her steam trials satisfactorily, and attained a speed of over 20 knots.

Royal Mail Steamship Co.—This company, in view of its recent great developments, has issued a prospectus inviting applications for £400,000 4½ per cent. debentures and £850,000 5 per cent. to enable capital to be found for the recent acquisition of the Union Castle line of steamers. Already the company owned in conjunction with the Pacific Steam Navigation Co. eighty-three steamers, and has at present under construction three new boats, the *Descado*, *Demerara* and *Desna*. The third of these was launched lately and is 517 ft. long with a tonnage of 11,000. It will be seen, therefore, what gigantic proportions the new combine will possess when complete.

Port of London.—The Port of London Authority has decided to construct a riverside jetty at Tilbury. The view has been expressed that many vessels only have part cargoes for particular ports and that such ships do not need fully enclosed docks with transit sheds and equipment. If this is so the jetties would appear to meet the case, and here facilities would be afforded for goods unloaded the same as if the vessel had entered the docks. The step seems in the right direction and likely to attract new business entirely which now goes to other or Continental ports.

Lambeth Bridge.—This undertaking, as submitted by the London County Council, has been rejected by the House of Commons on the plea that the proposed structure was too steep and narrow and not sufficiently imposing, in view of its proximity to the Houses of Parliament. Cheap and nasty was the description, and mainly on these grounds it was rejected. As laid down in the plan, it was to be 48 ft. wide and cost £240,000, but this was not considered sufficiently wide and of the gradients to accommodate the large traffic anticipated.

Shipbuilding Transfer.—Messrs. Rennie & Co., of Greenwich, have decided to remove their works from Thames Street to Wivenhoe in Essex, where extensive premises have been purchased. There is here a dry dock 240 ft. long, three berths for docking vessels, a hauling-up slip, and a large amount of available land. The Thames shipbuilding resources are thus further being reduced by this transfer.

MERSEY AND MANCHESTER SHIP CANAL.

(From our Own Correspondent.)

THE labour unrest continues to seriously affect the shipbuilding trade of the Mersey port. While a scheme has been dawn up and approved whereby the dock labour of the port will be placed upon a more permanent basis, the majority of the engineers are at the time of writing out on strike. There is indeed a crying need for some form of arbitration based upon a higher level than that of the principle of the opposing of two equal and opposite forces.

Messrs. Cammell, Laird & Co., Ltd.—The shortage in the coal supply, together with a strike of the firm's engineers, has somewhat disturbed the usual routine of work. The former involving three-quarter time with no work on Saturdays, while the latter, which it is hoped will soon terminate, a certain amount of inconvenience. As compared with the Clyde, Tyne and Barrow, the firm's offer of one shilling per week

advance would place the local rate upon an equal footing. The men however are asking for two shillings. This claim if granted, together with heavy maintenance charges due to tidal causes, labour supply and other local conditions, would place the firm in unfair competition with other centres. Not only local but national interests are at stake and labour leaders should, when making their demands, remember that orders that should be placed at Birkenhead or at least British yards are already finding their way to America and the Continent. The work in hand for the British Admiralty is making satisfactory progress. The Commonwealth cruiser *Melbourne* was expected to be launched on April the 10th, but this may be interfered with by recent events. The tender to depot ship *Adamant* and the destroyer *Lapwing* are now being prepared for commission. The sister vessels *Mersey* and *Lizard* are also nearly ready for handing over. The floating dock is expected to be floated out of the mud dock sometime next month while the battleship is also shortly expected to be launched. The last Norwegian-American liner is rapidly being pushed forward. The L. and N.W. Railway steamer *Greenore* is in the wet dock receiving her turbine machinery. The twin screw launch *Luana* is now complete, and after being partially dismantled will be shipped to the Congo. This craft has been built for Sir Wm. Lever, of Port Sunlight. The order was placed with the Vauxhall Engine Works, Messrs. Cammell, Laird & Co. having built the hull. The boat is 80 ft. long, 12 ft. beam and 5 ft. deep, and has a speed of 11 knots. The repair department have had in hand several important contracts. A large staff of men are engaged in renewing the refrigerating pipes in the steam "zone" which is in the wet dock. The *La Marguerite* and the *Snowdon*, of the North Wales Steamship Co., are also in dock, the former for sponson and paddle box renewals. A third paddle steamer, the *Mona's Queen*, is also in for new crank shaft. The Anglo American oil steamer *Appalachie* and the G.W. Railway steamer *St. George* have been in for general overhaul. The Cork Steamship Co.'s *Kerman* is in the firm's hands being reboilered.

Messrs. H. & C. Grayson, Ltd.—Work is still in progress on the Canadian Pacific Railway steamer *Lake Champlain*, a new stern frame is being fitted. The G.W. Railway steamer *Lynx* is being reboilered. A new engine bed plate is being fitted to the steamship *Samson*. The Wilson liner *Scipio* has been undergoing general overhaul and repairs at the Herculaneum Dock. The steamer *Clifford* which has had 21 ft. built into her length has now left Messrs. Grayson's hands. The new C.P.R. liners now building at the Fairfield yard are being supplied with McKay's patent boat disengaging gear, of which Messrs. Grayson are the makers.

Messrs. Clover, Clayton & Co., Ltd.—From recent heavy weather and other causes, this firm have had their docks well filled with disabled and damaged craft. Amongst several may be mentioned the large Liverpool steamer *Semantha*, the steamer *Prado*, lately purchased by Glasgow buyers, the *Black Rock* and *Priscilla* etc.

The Cunard Line. An important change has been made in the times of sailing from New York by the boats of this line. In order to use the fast steaming of the *Mauretania* and *Lusitania* to the best advantage New York will be left at one o'clock instead of nine o'clock in the morning as formerly. This will enable passengers to reach London about the same time as they formerly reached Fishguard. Captain Pritchard, late of the *Mauretania* with Sir Wm. Matthews resident engineer of Dover harbour and staff made an inspection of Fishguard on March 5th. Considerable improvements are expected to follow as a consequence. The new boats ordered from Messrs. Scott, of Greenock, for the Canadian service from Southampton are to be named the *Andania* and *Ausonia* and will be of 13,000 tons.

Ellerman City Line. The new steamer *City of Poona* built by Messrs. Swan Hunter & Wigham Richardson Ltd. for the Ellerman Liverpool-Calcutta trade, reached the Mersey on March 7th. Special interest attaches to this vessel, the first twin screw steamer built for the City Line. The dimensions are length 400 ft. overall, beam 50 ft. 6 in., depth 33 ft. 10 in., with a displacement of 12,000 tons. The twin engines are triple-expansion of 5,000 i.h.p., giving the vessel a speed of 14 knots on trial.

Anchor Line.—Mr. John G. Rees, Liverpool manager and assistant secretary of the Anchor Line, is retiring after 58 years' service. Mr. Rees joined the line at its inception in 1854 and is a well known figure in the shipping life of the port.

The School Ship "Conway."—On Feb. 23rd the [illegible] on board were sent home, twenty cadets were attacked [illegible] an epidemic of measles, three cases having proved fatal.

The Isle of Man Steamship Co.—Tenders have been received from seven firms on the East and West Coast for a turbine steamer for this company. The vessel will be [illegible] ft. long with a beam of 42 ft. and will be an improved *Snaefell* which boat, built by Lairds, has proved highly satisfactory. It is expected that 1300 to 1400 passengers will be carried and a sea speed of 20 knots will be attained. A bi-weekly service besides the usual fortnightly service will be run between Ramsey and Whitehaven during July, August and part of September.

Messrs. Harland & Wolff's New Yard.—Messrs. Harland and Wolff have leased the North Dock and Regent Road, Bootle, from the Dock Board for sixty years from April last. Mr. James Mace, assistant engineering manager at Belfast has been appointed general manager. [illegible] hands will be employed which may be increased to [illegible] later on. Naval and mercantile repairs will be carried out. Work will be commenced upon the buildings etc., at once, and these are expected to be finished about July or August.

NORTH-WEST OF ENGLAND.

(From our Own Correspondent.)

Very Brisk Times.—Notwithstanding the coal strike, shipbuilders in the Barrow district are exceedingly busy and week by week employers are engaging the services of additional men. At present Messrs. Vickers, Ltd., are employing nearly 10,000 hands at their naval construction yard at Barrow, and there is probably work in hand for another 2000 men if they could be got, but there are two difficulties to face, the first being that shipbuilders are very well employed in other centres, and the second that there is a great scarcity of house accommodation in the town. The latter defect is being remedied by the enterprise of builders, who are as busy as possible in putting up new houses. Overtime is being worked in all departments except that of the black squad, whose society has prohibited any hours being worked in addition to the ordinary day. This is resulting in the delaying of work in hand which with the new orders in hand it is essential should be completed with as little delay as possible. The Vickers' firm were fortunate in securing a large stock of coal before the strike commenced, and since then they have had large deliveries from the Continent and South Wales. It is anticipated they can go on for three months before this stock is exhausted, and in the meantime the firm are supplying many of their employees with coal for domestic purposes. They have also given their men large supplies of firewood.

A New Order.—Messrs. Vickers, Ltd., have for some time past been experimenting with the Carel Diesel oil engine for the purposes of ship propulsion, and it is reported the tests they have made have proved highly successful. Secrecy is being observed as to the features of the engine, but it is interesting to know that they have booked an order for a cargo-carrying vessel to be propelled by two of these engines acting on individual screws of [illegible] horse power each, the displacement of the vessel being about 8,000 tons. Much success is anticipated from this experiment. These engines are said to have shown marvellously economic results.

The Trials of H.M.S. "Phœnix."—Official information as to the trials of H.M.S. *Phœnix*, torpedo-boat destroyer, built by Messrs. Vickers, Ltd., are refused, but it is generally known that on her trials she proved to be a fast. She [illegible] by oil fuel.

Reported Russian Order.—A New York correspondent telegraphed to the "Telegraph" early on in the [illegible] it was probable two Russian super Dreadnoughts would be built by Messrs. Cramps of Philadelphia [illegible] ships by Messrs. Vickers, Ltd., at Barrow. There is probably no truth in the statement except in so far as [illegible] the vessels to be built by the Vickers' firm at Newcastle in the Black Sea, the engines of which will be built at Barrow.

the firm have not room at the moment to put down any more Dreadnoughts at the Barrow yard, although a scheme has been adopted for adding two more permanent slipways in the shipyard.

H.M.S. "Delhi."—The order from the British Admiralty to build the super Dreadnought *Delhi* is being proceeded with in its initial stages at any rate but it does not yet seem to have been determined on which slipway to lay down the new vessel. There is one slipway vacant alongside the Turkish battleship, and another will be vacant when the Japanese battle-cruiser *Kongo* is launched next month, but it is reported they have already the order for another battleship to occupy this berth.

Submarines. There is a very busy time in the submarine department of the Vickers' yard. Considerable attention is being directed to the completion of several vessels of the "D" class yet to be delivered. It is intended to build the vessels of the "E" class, three of which have been ordered by the Admiralty in another part of the yard, as the site occupied by the present shed is required for the extension of permanent slipways to carry the heaviest class of war or commercial ships.

A New Airship. The shed in which airship No. 1 was built at Barrow, which has been in charge of the Admiralty since the unfortunate wreck of this vessel, has now been handed over to the Vickers' Company, and when the old vessel has been taken to pieces and removed the construction of the new airship will be commenced. No official information is available as to the size and dimensions of this vessel either from the Admiralty or the builders.

H.M.S. "Princess Royal."—The alterations to H.M.S. *Princess Royal* are being proceeded with. Two of her masts have been removed and the forward funnel has been removed. It is expected these alterations will delay the vessel for a couple of months. She is expected to go on her trials in May.

The P.S. "Prince of Wales."—Important alterations are being made with the paddle steamer *Prince of Wales*, owned by the Isle of Man Steam Packet Company. They will be complete in time for the vessel going on the summer service.

Guns for Aeroplanes.—Messrs. Vickers, Ltd., have perfected a quick-firing gun for use on aeroplanes and airships, and it has undergone very successful tests at the Eskmeals range on the Cumberland Coast. It is light in construction, weighing less than a hundred pounds, yet can deliver very effective shots without damaging the frail vessels from which it is to fire.

The Steel Trade.—The steel mills in the district as well as all the blast furnaces, are stopped in consequence of the coal strike. It is possible shipbuilders will be inconvenienced in the non-delivery of material in consequence.

The White Star T.S.S. "Titanic" is booked to leave Southampton on April 10th on her maiden voyage.

Junior Institution of Engineers.—A short lecture was given before this Institution on March 15th by Mr. A. H. Weston, who took for his subject "Crude Oil Engines of the Semi-Diesel type."

Messrs. Palmer's Shipbuilding & Iron Co., Ltd.—It is understood that this Company, which hitherto had had only a lease of the Hebburn Dry Dock, have now bought the dock outright, and intend to widen it to permit of its accommodating the highest class of warships.

New Tug for Swansea.—The Swansea Harbour Trustees have placed an order with Messrs. John Cran & Co., Leith, for the construction of a powerful steel twin-screw tug, to the designs of Messrs. James Pollock, Sons & Co., Ltd., London.

Mr. H. Hollingworth, well known in motor-boat circles, has instructed Messrs. J. W. Brooke & Co., Ltd., of Lowestoft, to build for him a boat for the British International Trophy Race in 1913. Hull and machinery are to be built by Messrs. Brooke, and the boat must be running by the end of this year.

Smoke Abatement Exhibition.—This exhibition, now being held at the Agricultural Hall, Islington, opened on the 23rd of March and continues until April 4th. A conference was recently held in connection with the Exhibition, and a number of papers were read dealing with the effects of smoke upon buildings and metal work, etc. Many public authorities sent representatives to the conference, including foreign Municipalties.

BELFAST.

(*From our Own Correspondent.*)

Messrs. Harland & Wolff.—A day or two after last month's notes had been penned official confirmation was forthcoming regarding the taking of a site by the Queen's Island firm for the purpose of starting repair works in Liverpool. The ground which they have secured is situated at the North Docks. It is one of the finest sites on the Mersey, and is admirably suited to the purpose for which it has been taken. Following directly on the heels of this came the news that Messrs. Harland & Wolff had bought a Clyde yard—that of the London and Glasgow Engineering and Iron Shipbuilding Co., Ltd., The fact that they are being paid £9 3s. per share for shares that for a considerable period stood at £6 has, naturally, given entire satisfaction to the shareholders, and some surprise has been expressed in Glasgow shipbuilding circles regarding the excellent terms obtained by the present holders. Lord Pirrie will now be able to keep constantly taxed to its fullest capacity a yard that has rarely been too well off for work. It was inevitable that Messrs. Harland & Wolff should extend their operations by taking another shipbuilding establishment, for they have so many orders on hand that they have been forced to sub let the building of several vessels to other firms. The fitting-out of the White Star liner *Titanic* has almost been completed, and within a few days of writing this magnificent vessel will be ready for sea. Her sister ship *Olympic*, was dry-docked here early in the month for propeller repairs. The completion of other vessels at the fitting-out berths is being pushed on rapidly, including the fitting-out of the Belfast Steamship Co.'s new steamer *Patriotic*, which has been designed for the owners' service between Belfast and Liverpool. It is expected that she will be on her station at Easter.

Messrs. Workman, Clark & Co.—This firm's two yards are both fully occupied, and they are booked up with orders that will keep them going at full pressure for several years. Within a few days they will launch from their South Yard another addition to the well-known fleet of Messrs. Alfred Holt and Co. They still have the Ellerman liner *City of Lahore* in graving dock. The necessary repairs have turned out more extensive than was anticipated, and the vessel will be in dock for some time longer. They have also carried out minor repairs to several other vessels during the past few weeks.

The Coal Strike.—At the time of going to press the shipyards have been able to keep going at full strength, and have still sufficient stocks to enable operations to be carried on for some time longer. Several of the foundries up town have, however, had to partially close down, and all the coal quays and sheds are nearly empty.

Messrs. Harland & Wolff are having four of their boilers fitted with oil fuel burning apparatus. Some time since they went to considerable expense in experimenting with oil fuel, and the steam jet system is now being adopted. The boilers that are being fitted for the purpose will be ready for work under the new conditions before these notes are in print, so that there will be no stoppage of work at the Queen's Island should the coal strike be prolonged.

LAUNCHES AND TRIAL TRIPS.

LAUNCHES—English.

McElwain.—On January 8th, there was launched at Workington by Messrs. R. Williamson & Son, a steel screw steamer, 186 ft. 4 in. long, designed to carry about 1,150 tons d.w. The vessel is built to the highest class at Lloyd's, and will be propelled by triple expansion engines, having cylinders 15, 25½, and 41 in. diameter, by 30 in. stroke, steam being supplied by a cylindrical steel boiler 14 ft. 6 in. diameter by 10 ft. 6 in. long, working at a pressure of 160 lb. The vessel, which has been built for foreign owners, was named *McElwain*.

Winlaton.—On February 1st, Messrs Robert Thompson and Sons, Ltd., successfully launched from their Southwick Yard a first class finely modelled cargo steamer, built to the order of Messrs. The Gordon Steam Shipping Co., Ltd., of London, she being the fifth vessel they have built for the same management. Her principal dimensions

are, *viz.*: Length B.P. 339 ft., breadth, extreme 48 ft. 0 in., and depth moulded 24 ft. 4 in. She has been built to take the highest class at Lloyds under special survey, and is constructed on the single deck principle, with bulb angle framing, leaving the holds clear of all obstructions. Poop and bridge will also be available for cargo. Ample water ballast is provided in the cellular double bottom and after peak. The tank top under boilers, also bunkers, are coated with patent enamel. Accommodation is provided for the captain, spare room, and steward, with dining saloon, etc., tastefully fitted up in polished mahogany, in a large house at the fore end of the bridge, with chart room and wheelhouse under flying bridge. The officers' and engineers' berths, with messroom, bathroom, etc., are placed in steel houses abreast the engine casing, and petty officers and crew in the forecastle. Five cargo hatches are fitted complete with all appliances for rapid loading and discharging, worked by powerful steam winches, and large multitubular donkey boiler of ample capacity for the supply of steam to the deck machinery. The engines of the triple expansion type, are by Messrs. Blair & Co., Ltd., of Stockton-on-Tees, having cylinders 24 in., 40 in., and 65 in., with a stroke of 42 in., steam being supplied by two large boilers, working at 180 lbs. pressure. On March 7th the vessel proceeded to sea for her trial run, the engines run with the utmost smoothness, and a mean speed of 11 knots was easily maintained.

Nantwen. On February 1st, Messrs. Richardson Duck & Co., launched from their yard a steel screw steamer of the following dimensions, *viz.*: Length overall 394 ft., breadth extreme 51 ft., depth moulded 30 ft. 4 in., gross tonnage about 4800 tons. This vessel, which has been built to the order of the W. & C. T. Jones Steamship Company, Limited, of Cardiff, will class 100 A1 in Lloyds Register, and has been built under special survey. She is of the single deck type, and has cargo poop, bridge amidships, and topgallant forecastle for crew, accommodation for captain, officers and engineers being fitted up in steel houses on bridge deck. A cellular double bottom throughout, and peak tanks are fitted for water ballast, and equipment includes seven steam winches, winch condenser for dealing with exhaust steam with separate circulating donkey, horizontal multitubular donkey boiler, steam windlass with quick warping ends, fourteen derricks, stockless anchors, steam steering gear, etc., etc. The engines by Messrs. Blair & Co., Ltd., have cylinders 26 in., 42 in., 70 in., with a stroke of 48 in., steam being supplied by three single ended boilers having a working pressure of 180 lbs.

Oakfield. On February 2nd, Messrs. William Gray and Company, Limited, launched the handsome steel screw steamer, *Oakfield*, which they have built for the Doughty Shipping Company, Limited, Messrs. H. Doughty and Company, West Hartlepool, Managers. She will take the highest class in Lloyd's Register, and is of the following dimensions, *viz.*: Length overall 371 ft. 6 in., breadth 51 ft. 3 in., and depth 25 ft. 1 in., with extra long bridge, poop and topgallant forecastle. The saloon, state rooms, captain's, officers' and engineers' rooms, etc., will be fitted up in houses on the bridge deck, and the crew's berths in the forecastle. The hull is built with deep bulb angle frames, cellular double bottom, and large aft peak ballast tank, eight steam winches, steam steering gear amidships, hand screw gear aft, patent direct steam windlass, shifting boards throughout, stockless anchors, telescopic masts with fore and aft rig, boats on deck overhead and all requirements for a first class cargo steamer. Triple expansion engines are being supplied by the Central Marine Engine Works of the Builders, having cylinders 25 in., 40 in., and 67 in. diameter, with a piston stroke of 45 in., and three large steel boilers for a working pressure of 180 lbs. per square inch. Messrs. Wardle, Dove & Co.'s "Bituminite" Fuel has been applied to the lower side bunkers, etc. The vessel went to sea on the 4th March for her trial trip, which was very successful, an average speed of 11½ knots being attained.

Lord Cromer. On February 2nd, the s.s. *Lord Cromer* was launched from the yard of Messrs. Craig, Taylor and Co., Stockton-on-Tees. The vessel, together with her machinery, has been built to the order of Messrs. John Herron & Co., of Liverpool, under the superintendence of Messrs. Flannery, Baggallay and Johnson, Ltd., of London, Liverpool and Rotterdam. The vessel is constructed on the Isherwood system, and is designed to carry a large cargo on a light draft, and her principal dimensions are, *viz.*: Length 400 ft., breadth 51 ft. 7 in., and depth 30 ft. She is classed 100 A1 at Lloyd's, and has a large poop, bridge and forecastle. Officers and engineers' accommodation is arranged in houses on the bridge deck, and on top of this is fitted the captain's cabin, and above this a flying bridge. The crew's accommodation is arranged in the forecastle. There are eight powerful winches driven by a large donkey boiler, and the vessel is equipped with up to date appliances for the rapid handling of cargo. The engines have been built by Messrs. Blair and Co., Stockton-on-Tees, and are of the triple expansion type, and have cylinders 26 in., 42 in. and 70 in., with a stroke of 40 in., which are to drive the vessel at a speed of [illegible] working pressure of 180 lbs. per square inch. A successful trial trip was run in March 14th, a speed of nearly 14 knots being maintained.

Marcelle. On February 3rd, Messrs. Osbourne, Graham and Co., launched from their yard at Hylton the steel screw steamer, *Marcelle*, which is the fourth vessel they have specially constructed to the order of Fernand Binet, Esq., of Caen, and is a sister ship to the "Marguerite," which was recently sent to sea. The vessel is a single decker, 270 ft. by 36 ft. 6 in., built to carry 2400 ton on a very shallow draft, and is of the self trimming collier type. Arrangements are made for a large amount of water ballast. Houses for the captain and officers are tastefully fitted out in Hardwood, and are of large size. The vessel is fitted with the most modern appliances for economical and quick working of cargo. She has been constructed to Lloyds highest class and also complies with the requirements of the French law. Machinery has been supplied by the North Eastern Marine Engineering Co., Ltd., Sunderland, to drive the vessel a speed of 10 knots loaded.

Atlantic City.—On February 3rd, Messrs. Ropner and Sons, Limited, Stockton-on-Tees, launched from their Shipbuilding Yard a steel screw steamer of the following dimensions, *viz.*: Length 392 ft., breadth 51 ft. 6 in., depth 30 ft. The vessel is built to the highest class in the British Corporation Registry, having main deck, poop, bridge and T.G. forecastle. Accommodation for captain, officers and engineers in houses on bridge deck, crew in the forecastle. The vessel has been built to the order of Messrs. W. R. Smith and Son, of Cardiff, and has double bottom for water ballast on the cellular principle, and in fore and after peaks. She will be fully equipped with an up-to-date outfit, including quick warping steam windlass, stockless anchors, steam steering gear amidships, and powerful screw gear aft. The appliances for loading and discharging cargoes expeditiously, are very complete, and include ten steam winches, double derricks to each hatch, steam being supplied by a large donkey boiler working at 100 lbs. pressure per square inch. The engines will be of the triple expansion type, by Messrs. Blair & Co., Ltd., of Stockton-on-Tees, of about 1900 I.H.P., having two steel boilers 17 ft. 6 in. by 11 ft. 6 in., 180 lbs. pressure of steam. On March 4th satisfactory trial runs were made, the vessel attaining a speed of over 11 knots.

La Palma.—On February 3rd Messrs. W. Harkess & Son, Ltd., launched from their shipbuilding yard at Middlesbrough, the finely modelled passenger and cargo steamer, *La Palma*. Her dimensions are, *viz.*: 220 ft. by 29 ft. 10 in. by 12 ft. 3 in., and she is classed 100 A1 at Lloyd's. She is of shelter deck type and has promenade and boat decks above, all of teak. Handsome accommodation is provided for a large number of passengers. The vessel will be equipped with most modern appliances in every department. Engines and boilers capable of driving her a speed of 12 knots will be installed by Messrs. MacColl & Pollock, Ltd., of Sunderland. She is built to the order of Messrs. Elder, Dempster & Co., Ltd., of Liverpool, and is intended for the Inter-Insular mail and passenger service of Grand Canary.

Carola.—On February 5th there was launched from the yard of Messrs. Cochrane & Sons, Selby, a steel screw trawler, the principal dimensions being 125 ft. by 22 ft. by 12 ft. 6 in. moulded. The vessel has been built to the order of Messrs. The Grant & Baker Steam Fishing Co., Ltd., Grimsby, and will be replete with all the latest improvements for the fishing trade. She will be fitted with

powerful triple expansion engines by Messrs. C. D. Holmes and Co., Ltd., of Hull.

Florentia.—On February 5th, there was launched from the Yard of the Tyne Iron Shipbuilding Co., Ltd., Willington Quay on Tyne, a steel screw steamer, built to the order of the International Line Steamship Co., Ltd., of Whitby. She is built on the "Isherwood" Patent system of longitudinal framing, and is the fourth vessel built on the "Isherwood" system by these builders, who were the first to build this type of boat on the Tyne. The vessel is built to the highest class at Lloyds', and is of the following dimensions, *viz.*: Length overall about 360 ft., breadth extreme 50 ft., depth moulded 25 ft. 10 in. She is built under the single deck rule with poop, bridge and forecastle. Has water ballast fitted right fore and aft on the cellular system, and is also fitted with all modern improvements for the rapid loading and discharging of cargo, including three double cylindered steam winches, direct acting steam windlass, large multitubular donkey boiler, steam steering gear by Messrs. Donkin & Co., with right and left screw gear aft. She is fitted with double derricks to all main cargo holds, and has derrick posts on bridge for dealing with the cross bunker hatch, and is in all respects an exceptionally good example of the modern cargo steamer as she carries about 6400 tons deadweight on the very light draft of 21½ feet. The engines, which are to be supplied by Messrs. John Dickinson & Sons, Ltd., of Sunderland, are of the triple expansion type, having cylinders 24 in., 4 in., and 66 in. by 45 in. stroke, with two boilers 16 ft. by 10 ft. 6 in., working at a pressure of 180 lbs.

Queen Louise.—On February 5th, The Northumberland Shipbuilding Co., Ltd., launched from their yard at Howden-on-Tyne, a finely moulded steamer, built to the order of Messrs. Thos. Dunlop & Sons, Glasgow, to augment their fleet of fine steamers. The vessel is the eighth built for this firm, and is over 415 ft. long by 53 ft. 1 in. beam by 39 ft. 9 in. deep, and has been built under special survey to the highest class at Lloyds', with extra strengthening for special freeboard. She is fitted with long poop, long bridge, topgallant, forecastle, the accommodation, which is very ample, being placed in steel houses on the bridge deck. The 'tween decks are lofty, and so arranged that cattle, troops, or emigrants may be carried if necessary. The loading and discharging facilities are most complete, the steamer having ten steam winches by Messrs. Clarke, Chapman & Co., Ltd., Gateshead-on-Tyne, and a large number of cargo derricks to ensure the expeditious handling of cargoes. She is fitted with the usual water ballast arrangements for light passages. The machinery will be supplied by Messrs. The North Eastern Marine Engineering Company, Limited, Wallsend-on-Tyne, consisting of engines with cylinders 26 in., 42 in., 72 in. by 48 in. stroke, three large steel boilers, 15 ft. 6 in. by 11 ft. 9 in., 180 lbs. pressure. The vessel will carry about 8300 tons deadweight on the light draft of 24 ft. 3 in., and steam about 10 knots loaded at sea. Messrs. Wailes, Dove & Co.'s "Bitumastic" Covering has been applied to the tank top in the boiler space.

Northern.—Messrs. Joseph L. Thompson & Sons, Limited, of the North Sands Shipbuilding Yard, Sunderland, recently launched this beautifully modelled vessel, which has been specially constructed to the order of Messrs. Harris and Dixon, Limited, of London, and is the fourth vessel Messrs Thompson have constructed for this firm. The principal dimensions of the vessel are, *viz.*: Length 410 ft., breadth 54 ft. 2 in., and depth 28 ft. 6½ in., the vessel having a large deadweight capacity on a moderate draft of water. The vessel is of the single deck type, with a complete shelter deck, water ballast being carried in the cellular double bottom and in both peaks. The vessel will have a specially good complement of gear for the rapid handling of cargoes, the deck machinery being supplied with steam by a large donkey boiler. A complete electric lighting installation is being fitted by Messrs. The Sunderland Forge and Engineering Co., Ltd. The propelling machinery has been constructed by Messrs. John Dickinson & Sons, Limited, of Sunderland, the sizes of the cylinders being 27½ in., 44½ in., 74 in. by 48 in. stroke, supplied with steam by three large boilers working at 180 lbs. pressure.

Lettsu.—On February 6th, there was launched from the yard of Messrs. Cochrane & Sons, Selby, a steel screw trawler, the principal dimensions being 120 ft. by 21 ft. 6 in. by 12 ft. 6 in. moulded. The vessel has been built to the order of Messrs. Neale & West, Ltd., Cardiff, and will be replete with all the latest improvements for the fishing trade. She will be fitted with powerful triple expansion engines by Messrs. C. D. Holmes & Co., Ltd., of Hull.

Torridge.—On February 20th there was launched at Sunderland a screw steamer of the improved single deck type, with full poop, long bridge and top-gallant forecastle. Her dimensions are: Length, 408 ft., beam 52 ft. 9 in., depth 29 ft. 3 in., deadweight about 8200 tons on a moderate draft of water. The vessel has good lines, and will attain a mean speed of about 10½ knots loaded at sea. She is built to the highest class of the British Corporation with wide pitched frames, and the holds are absolutely clear of all obstruction. The vessel is fitted with powerful machinery by the North-Eastern Marine Engineering Company, Ltd., Sunderland, of their latest type, having separate independent condenser. The engines have cylinders 26½, 44, 73 in., by 48 in. stroke, supplied by steam from two large single-ended boilers, fitted with forced draught, and capable of developing 2500 h.p. at sea. There is an unusually good outfit of auxiliaries in the engine room. This is the twenty-fifth vessel that the owners (The Tatem Steam Navigation Company, Ltd., of Cardiff) have had built on the North-East Coast.

Greenore.—On February 20th Messrs. Cammell, Laird and Co., launched at Birkenhead the steamer, *Greenore*, the first turbine passenger vessel built for the London and North Western Railway Company's service between Holyhead and Greenore. The vessel is of the following dimensions:—Length, 305 ft., breadth 40 ft., and depth to bridge deck 23 ft. 3 in. The large deck-house on the poop, and the bridge decks, as well as the 'tween-deck space and lower deck amidships, are fitted for the accommodation of first and third class passengers, sleeping accommodation being provided for 170 people. The first-class dining saloon is situated on the main deck, and is furnished in the best style, the walls being framed and panelled in solid oak. Accommodation for the third-class passengers is fitted up aft, on the lower main and poop decks, and consists of large open cabins with portable berths. The open space on the main deck is arranged for the carriage of horses and cattle. The propelling machinery consists of triple screw turbines of the Parsons type, and supplied with steam from five water-tube boilers fitted with forced draught on the close stokehold principle. She will have one high-pressure turbine on the centre shaft and a low-pressure turbine on each wing shaft. On service the steamer will have a speed of 21 knots.

Corsinia.—On February 20th this vessel, built to the order of the Societa di Navigazione a Vapore E. M. Premuda & Co., Lussinpiccolo, was launched by Messrs. Wm. Doxford & Sons, Limited, Pallion, Sunderland. The *Corsinia* is of the single-deck type, length 385 ft., breadth 50 ft., and of 28¾ ft. moulded depth; the deadweight capacity is 7500 tons, and the classification is with Lloyds 100 A1 and Austrian Veritas. Messrs. Doxford are supplying the engines and boilers.

Screw Steamer.—On February 20th the Northumberland Shipbuilding Company, Limited, launched from their Yard at Howdon-on-Tyne a finely moulded Screw Steamer, built to the joint order of Messrs. Houlder Middleton and Co., Ltd., and Andrew Weir & Company of London. The vessel is 390 ft. long by 49 ft. beam by 29 ft. 4 in. deep, and has been built under special survey to the highest class at Lloyds. She is fitted with long bridge, long poop and topgallant forecastle, the accommodation, which is very ample, being placed in steel houses on the bridge deck. This steamer has been specially designed with a view to rapid loading and discharging of homogenous cargoes, the hatchways being very long and wide, and are arranged for garing carrying in bulk, a complete set of shifting boards being fitted throughout to latest Board of Trade requirements. Ample deck gear is provided, consisting of steam winches by Messrs. Clarke, Chapman & Co., Ltd., Gateshead-on-Tyne, and a large number of cargo derricks to ensure the expeditious handling of cargoes. The propelling machinery will be supplied by Messrs. Richardsons, Westgarth & Co., Ltd., Sunder-

land, consisting of engines with cylinders 23 in., 41 in., 69 in., and 48 in. stroke, with three large tee boilers, working at 180 lbs. pressure. The steamer will carry over 7700 tons on a light draft, and steam about 10 knots loaded at sea.

Anglo-Californian. On February 21st, the s.s. *Anglo-Californian* was successfully launched from the shipyard of Messrs. Short Brothers, Limited, at Pallion, Sunderland. She is built to the order of The Nitrate Producers Steamship Co., Limited, of London (Messrs. Lewther Letts & Co., Managers), with leading dimensions of 448 ft. length, 56 ft. 4 in. beam, and 30 ft. 7½ in. depth moulded, and is designed to carry a deadweight of about 11330 tons. The vessel is built on the Isherwood system of longitudinal framing, with shelter, upper and main decks of steel, and the entire length, and will take Lloyds highest class, and is the largest vessel yet built on the West to Mr. Isherwood's patent system. A double bottom has been fitted throughout for the carriage of oil fuel or water ballast, and the fore and after peaks are also arranged for water ballast. The holds and 'tween decks are supported by seven watertight bulkheads. The shelter deck has been fitted with four large doors through sides, so that the steamer may be readily adapted for the conveyance of horses and cattle. A dining saloon, neatly panelled in oak, is fitted in a large steel house on shelter deck with four staterooms for passengers, accommodation for the captain, with chart room, office and library, and another part berth is in a house above saloon house. The officers and engineers are berthed in houses abreast of engine casing on shelter deck, and the crew and petty officers in the after end of shelter deck. The accommodation throughout has been specially designed to give the greatest possible comfort to officers and crew. Stateroom and messroom are provided for officers and engineers, and a very complete sanitary service is installed, including baths for crew, officers, engineers, captain and passengers. Electric light is arranged throughout the accommodation, in engine room and tunnel, with large clusters over each hatchway. The cargo arrangements are very complete, 10 derricks being fitted on tables at masts, and in addition an arrangement of Porter's patent derrick gear to lift 30 tons will be available at each mast, the masts being strengthened to carry this weight. Two derricks to work the cross bunker hatch are placed on strengthened posts, the posts being utilised for ventilation of stokehold. Ten steam winches, two with extended ends and the after winch fitted with gipsy wheel, hitch and brake for stream cable, steam windlass, steam steering gear amidships controlled by rods from standard on flying bridge and connected by chains and rods to powerful four armed quadrant on rudder head. Cheapter's self tipping ash hoist with shoot over side and fresh water distiller will be supplied, taking steam from a multitubular boiler at 120 lbs. pressure placed in stokehold and exhausting to a "Contrablo" winch condenser at discharge recess. Hand steering gear with two wheels, and Lyalls' patent rudder brake are also fitted. Clayton's Fire Extinguishing system is installed to all compartments. The vessel will proceed to the North Eastern Marine Engineering Co., Limited, Wallsend Works, to have the propelling machinery placed on board. This consists of quadruple engines with cylinders 25½, 36½, 52, and 76 in. diameter, and a stroke of 54 in., driven from three large boilers at 220 lbs. pressure, fitted with Howden's forced draught. The machinery has been designed throughout with a view to continuous working, being considerably strengthened above the usual practice, with extra large bearing surfaces at all working parts. The main condenser is of the Contrablo type.

Melton. On February 21st, there was launched from the Shipbuilding and Repairing Establishment of Messrs. S. P. Austin & Son, Limited, the steel screw steamer, *Melton*, classed 100 A1 in Lloyds' Register, which has been built to the order of Messrs. the Denaby and Cadeby Main Collieries, Limited, of Rotherham and London, this being the fourth vessel constructed at this Yard for the same owners. The vessel has been specially built for the owners' coal trade, will carry about 290 tons deadweight on a light draught of water, is adapted for quick loading and discharging, complete with Mirrlees' patent gear for steam colliers, is fitted with arrangements for wireless telegraphy, large crew, wireless, chart room, bathroom, and cabin for officers, accommodation for captain, officers and engineers in poop, and crew in forecastle. The machinery will be supplied by Messrs. George Clark, Limited, of Sunderland. Cylinders 21 in., 33 in., 56 in. by 36 in. stroke, with a pressure of 180 lbs. per square inch, for working, to work at a pressure of 180 lbs. per square inch, for working fast passage. Messrs. Weir's Pumps and Condensers have been applied to the boiler room tank top.

Hondo. On February 22nd there was launched from the yard of Messrs. Thomas Brake and Sons, Selby, a twin screw trawler, the principal dimensions being 130 ft. by 22 ft. by 12 ft. 3 in. moulded. The vessel has been built to the order of Mr. H. I. Taylor, of Grimsby, and will be replete with all the latest improvements for the fishing trade. She will be fitted with powerful triple expansion engines by Messrs. C. D. Holmes & Co., Ltd., of Hull.

Brocklesby. On February 22nd the first of two steel paddle steamers, built to the order of Messrs. the Great Central Railway Company for passenger ferry service between Hull and New Holland was launched from Earle's Shipbuilding and Engineering Company's Yard. The principal dimensions of this steamer are: Length 195 ft., breadth 31 ft., depth moulded 9 ft. The vessel has been constructed to the Board of Trade requirements for steam 3, 4 and 5 passenger certificates, and will be fully equipped for the respective services. She is of double-ended type, enabling her to steam equally well both ways, having a rudder at each end of the vessel. A spacious promenade deck with seating accommodation is provided for both 1st and 3rd class passengers, and on this deck is situated a smoking room with rectangular windows and dome skylight for 1st class passengers, also a chart room for the captain with easy access to the navigating bridge. A commodious 1st class saloon with rectangular windows and large dome skylight is arranged on the main deck, having handsome entrance, with open well and double staircase leading to the lower saloon; these saloons and also the smoking room will be tastefully upholstered in lacquette. A large cabin for 3rd class passengers is arranged below the main deck with rectangular port lights similar to 1st class lower saloon and patent lights on deck. The crew are berthed adjacent to this cabin. Provision has been made for carrying cattle, the fittings being portable. The steering gear is of the telemotor type fitted in duplicate, and a hand windlass is supplied. The vessel has a jury mast with yard for signals, and is fitted with a complete installation of electric light. The machinery consists of a set of compound diagonal paddle engines of most up-to-date design, having cylinders 25 and 48 inches diameter with a stroke of 54 inches. Steam will be supplied by one large cylindrical boiler, working at a pressure of 150 lbs. per square inch. The vessel has been specially designed to enable her to cross the Humber direct at all state of the tide, and was built under Messrs. Earle's patent swivelling Twin Crane, which enabled the builders to equipped the ship with all machinery on board before launching ready for steam trials.

Screw Steamer. On February 22nd the Goole Shipbuilding and Repairing Co., Ltd., launched from their Victoria Shipyard, Goole, a specially modelled steel screw steamer of the following dimensions: Length B.P. 170 ft. by 28 ft. 6 in. by 16 ft. 6 in. The vessel is designed to carry about 300 tons deadweight, and built to Lloyds highest class with raised quarter deck, throughout her length, and is generally equipped in most modern way for the quick discharging of cargo. Continuous [illegible] The vessel has been built to the order of Mr. R. R. Chester, Ship Owner, Middlesbrough.

Killingholme. On February 24th the second of two steel paddle steamers, built to the order of Messrs. the Great Central Railway Company for passenger ferry service between Hull and New Holland, was launched from Earles Shipbuilding and Engineering Company's Yard. The vessel is a sister ship of the Brocklesby, launched on the 22nd February, under which see description.

Trevanion.—On March 2nd there was launched from the Shipbuilding Yard of Messrs. John Readhead & Sons, Ltd., West Docks, South Shields, a steel screw steamer, built to the order of Messrs. Edward Hain & Son, St Ives, Cornwall, and named the *Trevanion*. The dimensions of the vessel are: 381 ft. by 51 ft. by 27 ft. 8½ in., and she carries a deadweight cargo of 7650 tons on a light draught of water. She is of the improved single deck type, to Lloyd's highest class, and under their special survey, having poop, extra long bridge, and topgallant forecastle, with deep girder framing, and cellular double bottom fore and aft, with large after peak tank for water ballast. The outfit of the ship is very complete for general and grain trades, with shifting boards all fore and aft, and large hatchways as feeders. A full equipment of steam winches and derricks is fitted for the rapid loading and discharging of cargoes. The vessel will be fitted with triple expansion engines also constructed by Messrs. John Readhead & Sons, Ltd., having cylinders 26 in., 42 in. and 69 in. with 48 in. stroke, supplied with steam from two large steel boilers, working at a pressure of 180 lbs. per square inch. This is the fifty-seventh vessel built for the above firm by Messrs. John Readhead and Sons, Ltd.

A Floating Hospital.—On March 4th there was launched at Amlwch Port, from the Yard of Messrs. William Thomas and Sons, a floating hospital, constructed to the order of the Beaumaris Port Sanitary Authority (Joint Board). The vessel, which will be moored in the Menai Straits, is 80 ft. long, 23 ft. broad, and 11 ft. deep. She is of composite build, and contains a commodious patients' ward, state-room, and sleeping apartments for nurses and caretaker, and is fitted with modern sanitary arrangements. The vessel is in all respects admirably adapted for the purposes of an infectious disease hospital.

Karl Schroers.—On March 4th Sir Raylton Dixon and Co., Ltd., launched from their Cleveland Dockyard, Middlesbrough, a fine steel screw steamer, which they are building to the order of Mr. Karl Schroers, of Rotterdam, etc. The vessel is being built to Lloyd's highest class under special survey, and is of the single deck type with poop, bridge and forecastle. Her principle dimensions are, *viz.*:—286 ft. by 41 ft. by 20 ft. 6 in. moulded, and she will have a deadweight carrying capacity of about 3300 tons on a light draught of water. A large steel house on forward end of bridge deck will contain saloon and accommodation for captain, steward, etc., while officers and engineers will be berthed in side houses abreast engine casing. The crew will be berthed in forecastle. The vessel will have two large holds, four hatches, two masts, four derricks, and will be equipped with five steam winches, steam windlass, hand and steam steering gear, etc., and all the latest and most modern appliances for the rapid handling of cargo. Triple expansion engines, having cylinders 20½ in., 33 in. and 54 in. by 36 in. stroke, supplied with steam by two large single-ended boilers, working at 180 lbs. pressure, will be fitted by Messrs. Richardsons Westgarth & Co., Ltd., Middlesbrough.

Buranda.—On March 4th, Messrs. Richardson Duck and Co., Ltd., launched from their yard a steel screw steamer of the following dimensions:—Length overall 365 ft., breadth extreme 50 ft. 3 in., depth moulded 25 ft. 3 in., tonnage (gross) about 3610 tons, deadweight about 6000 tons. This vessel, which has been built to the order of Messrs. Burdick & Cook, of London, will class 100 A1 in Lloyd's Register, and has been built under special survey. She is of the single deck type, and has a cargo poop, bridge amidships, with accommodation for captain, officers, engineers in steel houses on bridge deck, and topgallant forecastle for crew. A cellular double bottom throughout and forward and after peak tanks are fitted for water ballast, and equipment includes large horizontal multitubular donkey boiler, six steam winches, steam steering gear, steam windlass with quick warping ends, stockless anchors, and all modern improvements for facilitating loading and discharging. The engines by Messrs. Blair & Co., Ltd., have cylinders 24 in., 40 in. and 66 in. by 45 in. stroke, steam being supplied by two single-ended boilers, having a working pressure of 180 lbs. This makes the 18th steamer that has been built to the order of Messrs. Burdick & Cook.

Marguerite.—On March 4th Messrs. William Gray and Company, Limited, launched the handsome steel screw steamer, *Marguerite*, which they have built for Messrs. Plisson & Co., Paris. She will take the highest class in Lloyd's Register, and is of the following dimensions, *viz.*: Length overall 346 ft. 6 in., breadth 47 ft. 6 in., and depth 25 ft. 7½ in., with long bridge, poop and topgallant forecastle. The saloon, staterooms, captain's, officers' and engineers' rooms, etc., will be fitted up in houses on the bridge deck, and the crew's berths in the forecastle. The hull is built with deep frames, cellular double bottom and large aft peak ballast tank, six steam winches, steam steering gear amidships, hand screw aft, patent direct steam windlass, large horizontal multitubular donkey boiler, shifting boards throughout, stockless anchors, telescopic masts with fore and aft rig, and all requirements for a first class cargo steamer. Triple expansion engines are being supplied by the Central Marine Engine Works of the Builders, having cylinders 25 in., 40 in., and 65 in. diameter, with a piston stroke of 42 in., and two large steel boilers for a working pressure of 180 lbs. per square inch.

Exmouth.—On March 5th there was launched from the Yard of Messrs. Cochrane & Sons, Selby, a steel screw trawler, the principal dimensions being 120 ft. by 21 ft. by 12 ft. 6 in. moulded. The vessel has been built to the order of Messrs. The Western Steam Trawling Co., Ltd., Bristol, and will be fitted with powerful triple expansion engines by Messrs. C. D. Holmes & Co., Ltd., Hull.

Start Point.—On March 5th Messrs. Irvine's Shipbuilding and Dry Docks Co., Ltd., launched from their Harbour Dockyard, the handsomely modelled steel screw steamer, *Start Point*, built to the order of Messrs. Furness Withy & Co., Ltd., for their Point Line. The vessel is of very fine lines, and the dimensions are 390 ft. by 50 ft. by 27 ft. depth moulded, carrying over 7000 tons on a light draught. She is built to British Corporation classification, having three complete steel decks, with cellular double bottom and fore and after peak tanks for water ballast. The vessel is constructed with deep sectional frames, and is divided into 7 watertight compartments by means of 6 watertight bulkheads. Four large hatches are provided, and a cross bunker hatch amidships, with all the latest facilities for the rapid loading and discharging of cargo, including 9 powerful steam winches exhausting to a Contraflo Winch Condenser in the engine room, and 10 derricks; a powerful quick warping steam windlass is fitted forward with steam steering gear amidships and hand gear aft. Electric light is fitted throughout, including large clusters at each cargo hatch. The vessel is fitted with additional bulkheads in the upper 'tween decks to minimise the risk of fire spreading from one end of the ship to the other. The captain, officers and engineers are berthed in large houses on the shelter deck amidships, and the sailors and firemen under the fore part of the shelter deck. Triple expansion engines will be supplied and fitted by Messrs. Richardsons Westgarth & Co., Ltd., Hartlepool, having cylinders 26 in., 42 in. and 70 in. by 48 in., with three large single-ended boilers, 180 lbs. pressure, including Contraflo Main Condenser, Contraflo Surface Feed Heater and Cascade Filter, bronze working propellor, spare tail shaft, and a very complete outfit.

Hilda and Ernest.—On March 6th there was launched from the Yard of Messrs. Cochrane & Sons, Selby, a steam drifter, the principal dimensions being 88 ft. by 19 ft. by 9 ft. 6 in. moulded. The vessel has been built to the order of Mr. Snowling of Lowestoft, and will be fitted with compound surfacing condensing engines by Messrs. Crabtree & Co., Ltd., Great Yarmouth.

Ploughboy and Eager.—On March 7th two steam drifters were launched from Messrs. Cochrane & Sons, the principal dimensions being 88 ft. by 19 ft. by 9 ft. 6 in. moulded. The vessels have been built to the order of Mr. Turrell and Mr. Allerton, of Lowestoft, respectively, and will be fitted with compound surfacing condensing engines and powerful triple expansion engines by Messrs. Crabtree & Co., Ltd., Great Yarmouth.

Sorrento.—On March 8th there was launched from the Yard of Earle's Shipbuilding and Engineering Co., Ltd.,

Hull, a finely modelled steel screw steamer. The vessel, which is named the *Sorrento*, is built to the order of Messrs. Thos. Wilson, Sons & Co., Ltd., and is intended for the Mediterranean and Baltic trades. The length of the vessel is 300 ft., breadth moulded 44 ft. 6 in., depth moulded 20 ft. She has been constructed of steel throughout to the British Corporation highest class, and to the latest Board of Trade requirements. The vessel is of the shelter deck type, with saloon deck house amidships, in which are situated the officers' rooms, the engineers being berthed in side houses abreast the engine casing. She has two steel pole masts and very efficient appliances for the speedy handling of cargo, the derricks, ten in number, being capable of dealing with heavy lifts. The derricks will be worked by powerful steam winches of the most up-to-date description, and a latest improved steam windlass by Messrs. Emerson, Walker & Thompson is also fitted. The steering engine is placed in the deck house aft, and is controlled by the telemotor system from the navigating bridge, powerful hand screw gear is also combined with the steam steering engine, both of which have been supplied by Messrs. Ames & Smith, Hull. The work throughout the vessel is of the very best description, with all the latest improvements. Triple expansion engines are provided by the builders, steam being supplied by two large steel boilers, designed to drive the vessel at a good speed on a minimum coal consumption.

LAUNCHES Scotch.

Letitia.—On February 20th there was launched at Greenock a steel twin screw steamer, built to the order of Messrs. Donaldson Brothers for their service between the Clyde and Canada. The principal dimensions of the ship are: Length between perpendiculars 470 ft., breadth moulded 59 ft. 8 in., and depth moulded 39 ft. 6 in. to the shelter deck. The vessel has been designed for the emigrant trade, and takes the highest class at Lloyd's. While primarily intended for passenger trade, the vessel will carry a large cargo, there being five holds worked by ten derricks and ten steam winches. Six single-ended boilers supply steam to two sets of three-cylinder triple-expansion engines driving two screws.

Princess Victoria.—On February 22nd there was launched at Dumbarton the turbine steamer, *Princess Victoria,* which has been built for the Larne and Stranraer Joint Railways. Her principal dimensions are:—Length 300 ft., breadth 40 ft., and depth to promenade deck, 24 ft. 6 in. She will have spacious passenger accommodation fitted up in first-class style, and she will have rudders both aft and forward. The propelling machinery consists of three sets of Parsons turbines, supplied by steam from water-tube boilers. Messrs. Wailes, Dove & Co's. "Bitumastic" Enamels have been applied to the bunkers, engine and boiler space, etc., and their "Bitumastic" Cement to the flat of bottom.

Ajana. On February 22nd there was launched on the Clyde a twin screw steamer for Messrs. Bethell, Gwyn and Co. Her dimensions are: Length 434 ft., breadth 56 ft. 3 in., and depth to upper deck (moulded) 38 ft. 3 in. The vessel, which is built to Lloyd's highest class three-deck rule, has a gross tonnage of 8800. She is fitted throughout between decks with accommodation for emigrants. On the shelter deck there is accommodation for a number of first-class passengers. She is intended for special trade between London and Australia, and is fitted with all the latest improvements and requirements, including insulated holds for the carrying of frozen meat. Lady Moore, wife of Sir Newton Moore, Agent General for Western Australia, named the vessel *Ajana*. Two sets of quadruple-expansion engines will be supplied. Messrs. Matthew Keenan & Co., Ltd., have the contract to cover the boilers and steam pipes with their Patent Non-conducting Composition.

New Dredger for the Argentine. On February 22nd Messrs William Simons & Co., Limited, Renfrew, launched a twin screw 2500 ton Trailing Suction Hopper Dredger, built to the order of the Argentine Government. This vessel, which is a sister ship to the "M.O.P. 2nd", constructed by Messrs. Simons two years ago for the same owners, is fitted with suction and self-discharging pumps capable of raising and discharging 2000 tons of material per hour. Four sets of triple expansion surface condensing engines are fitted on board for either propelling or pumping as may be required. Steam is supplied from four cylindrical multitubular boilers and one cylindrical multitubular donkey boiler, constructed for a working pressure of 160 lb. The main centrifugal pumps are connected to suction trunks fitted in central well at stern. The hopper doors are controlled by powerful hydraulic gear, the power being supplied from two duplex sets of steam pressure pumps. The hopper arrangement includes "Simons" patent water ballast, which enable the load in the hopper to be discharged overboard for reclamation purposes. The construction of the vessel has been supervised by Senor Ing. O. Figueroa, resident, and the Argentine Government, and the vessel, engines, boilers and machinery have been constructed to Bureau Veritas requirements.

Screw Steamer.—On March 5th a very fine new passenger screw steamer was launched by Messrs. Ramage & Ferguson, Ltd., for the North of Scotland and Orkney and Shetland Steam Navigation Co., of Aberdeen, for their service between Leith and Orkney and Shetland, the dimensions being:—Length B.P. 215 ft. by 31 ft. beam, and 16 ft. 2 in. depth moulded. Accommodation for a large number of passengers is arranged in a large number of handsomely fitted staterooms finished in enamelled white, the principal dining saloon, the sides of which are of polished hardwood, being in the after end of the vessel. Further forward another large saloon, suitable for dining 45 passengers is placed with numerous additional staterooms for passengers. For other classes of passengers ample accommodation is provided under the forecastle deck. All details for the comfort of travellers have been carefully arranged, the upholstery and furnishings generally being of the highest class. Only a small amount of cargo (about 350 tons) will be carried, and a number of steam cranes are provided for handling this, and ensuring very slight delays at intermediate ports, while ample electric light is also fitted throughout. Powerful triple expansion engines suitable for a high rate of speed at sea are provided, and are supplied with steam at a pressure of 190 lbs. from two large single ended boilers. Messrs. Matthew Keenan & Co., Ltd., are applying to the boilers their Patent Non-conducting Composition.

Aronda.—On March 7th Messrs. Alex. Stephen & Sons, Limited, Linthouse, launched the twin screw steamer, *Aronda,* for the Indian coastal service of the British India Steam Navigation Co., Ltd. She is one of the fastest class of the steamers recently built for this Company, and is 403 ft. in length, 50 ft. in breadth, and 33 ft. in depth, with three complete decks, and bridge and boat decks. There is superior accommodation for 50 first class and 50 second-class passengers, in addition to which special provision has been made for carrying native passengers in the two 'tween decks. The propelling machinery consists of two sets of quadruple expansion engines, with two double ended and four single ended boilers, all constructed at Linthouse.

Cargo Steamer. Messrs. Charles Connell & Co., Scotstoun, launched recently a steamer of 4500 tons for Messrs. Turner & Co., Liverpool. The vessel is classed 100 A1 at Lloyd's highest class and conforms to Board of Trade requirements in regard to passenger accommodation. The first-class state-rooms are arranged on the bridge deck. Electricity has been supplied for lighting purposes, and the cargo gear and deck machinery is of the best type. Engines will be supplied by Messrs. Dunsmuir & Jackson, Govan.

Mariston.—Messrs. Robert Duncan & Co., Port-Glasgow, launched recently the steel screw steamer, *Mariston,* built for Messrs. W. S. Miller & Co., Glasgow, for their grain carrying and general cargo trade. The principal dimensions of the vessel are as follows: Length 334 ft., beam 51 ft., depth 26 ft. 3 in., and deadweight carrying capacity 6400 tons. Messrs. Rankin & Blackmore, Greenock, will supply the machinery.

Blaxland. There has been launched at Cockatoo the steamer, *Blaxland,* built to the order of Messrs. Allen, Taylor & Co., Sydney. The vessel, which has been constructed for the Australian coast service, is of the following dimensions:—Length between perpendiculars 114 ft. breadth moulded 32 ft., and depth moulded 8 ft. She

[illegible] specially designed for the carrying of large timber, having a deep hold and a large hatch. The propelling machinery consists of two sets of compound surface condensing engines, with one boiler, working at 150 lbs. pressure. The vessel will have a service speed of nine knots. She was designed by Messrs. James R. Thomson & Son, Sydney, N.S.W., and during construction she has been under the supervision of Mr. John Speedie, Whitcomb, the owners being represented by Captain Simpson, London.

LAUNCH Irish.

Desna.—The Royal Mail Steam Packet Company have at present under construction by Messrs. Harland & Wolff, Ltd., Belfast, three large twin-screw steamers, named *Desna*, *Dessoria* and *Demerara* for the passenger service to Brazil and the River Plate. The third of this new class, the *Demerara*, was launched on March 2nd, and her dimensions are as follows: Length 517 ft. 3 ins., breadth 62 ft. 3 ins., gross tonnage about 11,200 tons. The first class dining saloon on the awning deck seats 120 persons at small rectangular tables, and extends the full breadth of the vessel. Additional first-class accommodation is provided as follows: First class smoking room on the bridge deck, panelled, framed and furnished in oak; first class lounge, at the forward end of the bridge deck; first class state rooms on the bridge deck, arranged in single and two berth rooms, and state rooms on the awning deck arranged in two and three-berth rooms on the tandem principle. Every 1st class cabin is provided with an electric fan. The intermediate dining saloon is on the awning deck aft, and the smoking room is situated on the poop deck. The state rooms for the intermediate class of passengers are arranged in the poop and are comfortably fitted; each cabin is provided with an electric fan. The third class general room, also the smoke room, are in the steel house on the awning deck aft the saloon, situated on the main deck amidships, and the third class shelter is under the forecastle. There are barber's shop, purser and doctor's rooms and surgery in convenient situations. The *Desna* will carry a large quantity of cargo, having holds insulated for the conveyance of chilled or frozen meat. There are also compartments insulated for dairy produce and fruit. The appliances for working ship and cargo are of the most modern type. The vessel will have a complete installation of electric light and submarine signalling apparatus. The engines are arranged on the "balanced" principle which has been so successful in eliminating vibration; and with the large airy cabins, electric fans and good promenades, these vessels will be exceedingly comfortable for passengers.

TRIAL TRIPS.

Astree.—On February 17th the new Wear-built steamer, *Astree,* proceeded on her official loaded trials. After proceeding to sea, the vessel made several runs fully loaded, when a mean speed of 11½ knots was obtained; after this a continuous four-hours' speed trial was run, which gave entire satisfaction. A Cochran (Annan) donkey boiler with patent seamless furnace has been supplied and fitted. See Launches, March.

Hooton.—On February 21st the fine steel screw steamer, *Hooton,* built by Sir Raylton Dixon & Co., Ltd., at their Cleveland Dockyard, Middlesbrough, to the order of the Denaby & Cadeby Main Collieries, Ltd., of London, etc., proceeded to sea for her official trials. The trials passed off most successfully, and the vessel proceeded, under the command of Capt. J. U. Scoble, to Hull, to load for Barcelona, Spain. See Launches, March.

Stiklestad.—On February 21st the large single deck steamer, *Stiklestad,* built and engined by Messrs. William Doxford & Sons, Limited, Sunderland, to the order of Messrs. A. F. Klaveness & Co., Christiania, ran a successful sea trial, when a mean speed of 12 knots was obtained. There were present at the trial—Capt. Raastad, on behalf of the owners, and representatives from Messrs. Bushell, Nicol & Co., Newcastle, and Norwegian Veritas. See Launches, March.

South Point.—On February 24th this vessel, which is a duplicate of the s.s. *Start Point,* launched March 5th, was completed at the Middleton Shipyard of Messrs. Irvine's Shipbuilding and Dry Docks Co., Ltd., and proceeded to Middlesbrough to take part of her cargo, afterwards proceeding to Leith on the 28th February to complete loading. On the run from Middlesbrough to Leith, a speed of 10¾ knots was easily maintained without fully opening out the machinery, which was considered highly satisfactory. See Launches, March.

City of Poona.—On February 24th, the twin-screw passenger steamer *City of Poona,* built by Messrs. Swan, Hunter and Wigham Richardson, Ltd., for Sir John Ellerman's City Line, made her trials. During her trials she attained a mean speed of nearly 14 knots on the measured mile, the machinery and boilers working without a hitch. For Launch see March issue.

Alert.—On February 27th, the new twin screw steamer, *Alert,* 777 gross tons, built by Ramage & Ferguson, Ltd., for the Honourable Corporation of Trinity House, London, completed her trials on the Firth of Forth. Although a gale was blowing, the trials were most satisfactory, a speed of 11.8 knots being obtained. Captain Flint, Chairman of the Lighting Committee, in proposing "The Health of the Builders," stated that the *Alert* was the third vessel built for the Trinity House by Ramage and Ferguson, Ltd., and the vessels had given satisfaction. Throughout the trials the engines worked faultlessly. See Launches, January.

Cairnhill. On February 28th the new steamer, *Cairnhill,* built by Messrs. Archd. McMillan & Son, Ltd., Dumbarton, for Messrs. MacBeth & Co., Glasgow, ran trials on the Firth of Clyde. The machinery has been supplied by Messrs. David Rowan & Co., Glasgow. On completion of the trials, which were in every way satisfactory, the steamer left for New York. See Launches, March.

Ranvik.—On March 1st the steamer, *Ranvik,* built on the Tyne to the order of Mr. P. A. Gron, of Sandefjord, Norway, was taken to sea for trial trip. The vessel was loaded with 11,000 tons of coal, and on the trial attained a mean speed on the measured mile of 11 knots. Immediately after the trial the vessel proceeded to Genoa under the command of Captain H. Berggreen. See Launches, March.

Thorpwood.—On March 1st the handsome steel screw steamer, *Thorpwood,* was taken from the Yard of Messrs. Wm. Gray & Co., Ltd., for her trial trip. The vessel has been built for Messrs. Constantine & Pickering Steamship Company, Middlesbrough. After adjustment of compasses the vessel was taken to Middlesbro', at which port she takes in her first cargo. On the run round a speed of 11 knots was attained. See Launches, March.

Cotswold Range.—On March 5th the steel screw steamer, *Cotswold Range,* built by Messrs. the Northumberland Shipbuilding Company, Limited, Howdon-on-Tyne, to the order of Messrs. Furness Withy & Company, Limited, West Hartlepool, left the Tyne for her official trial trip. This vessel carries about 7500 tons on a light draft, and steams about 10 knots loaded at sea. The trial trip proved in every way satisfactory, and a speed of 11¾ knots was obtained. See Launches, March.

Clan Davidson.—On March 13th the large shelter deck steamer, *Clan Davidson,* built and engined by Messrs. Wm. Doxford & Sons, Ltd., Sunderland, to the order of the Clan Line Steamers, Ltd. (Messrs. Cayzer, Irvine and Co., Ltd.), Glasgow, ran a successful sea trial, when a speed of 14 knots was obtained. See Launches, March.

Campania.—On March 13th last the s.s. *Campania* built to the order of the Fornyade Angfartygs Aktiebolaget Svenska Lloyd of Gothenburg, by the Campbeltown Shipbuilding Co., Campbeltown, and engined by Messrs. John G. Kincaid & Co., Greenock, ran trials at Wemyss Bay. The *Campania* is of the shelter deck type, and has a very complete outfit for the owners' special Mediterranean trade.

Mexicano.—The new Wear-built mail, passenger and cargo steamer, *Mexicano,* has been to sea for her speed trials. She has been built to the order of the Norway-Mexico Gulf Line (Mr. G. M. Bryde, managing director), of Christiania, Norway, and is intended for service between Norway, Cuba, Mexico and the United States, a round voyage occupying about 75 days. The line, which is subsidised by the Norwegian Government, last

year carried 135,000 tons of cargo as well as a large number of passengers. The *Mercator*, which is 360 ft. long, has a registered gross tonnage of 3500 tons, and takes the highest class with the Norwegian Veritas. The accommodation for first class passengers, officers and engineers is amidships, the third class passengers are provided for aft, and the crew and firemen are berthed forward. The vessel carries a deadweight cargo of nearly 6000 tons. The propelling machinery consists of a set of triple-expansion engines, with cylinders 24 in., 40 in. and 66 in. in diameter, by 45 in. stroke. Steam is supplied by two large boilers fitted with forced draught, and one supplementary boiler, all working at a pressure of 190 lbs. per square inch. On a continuous four hours' run at sea the *Mercator* attained an average speed of 13.2 knots, the highest speed attained on one of the runs being 16.6 knots, which was in excess of the designed speed. On the completion of the trial the *Mercator* left for Gothenburg to load, under the command of Captain Pedersen.

Electra. The steamer, *Electra*, recently launched at Sunderland, has been for her trial trip, when everything passed off satisfactorily. The vessel, which is 300 ft. long, has been built to the order of Messrs. Lucovich and Co., London. See Launches, March.

Sagona.—The steamer, *Sagona*, has been out for trial on the Tay. This vessel, which is specially strengthened to withstand ice shocks, is intended to engage in seal fishing in the Arctic regions, and to carry passengers and cargo at certain periods of the year. The engines have cylinders 16 in., 27 in. and 44 in., by 30 in. stroke, steam being supplied by extra large boilers, working at 180 lbs. pressure per square inch. A speed of 11 knots had been guaranteed, and this was easily attained. The ship and machinery has been built for the Newfoundland Produce Company, of St. John's, and has left for that port to take part in this season's sealing.

Chevington. The new screw steamer, *Chevington*, built by Messrs. John Readhead & Sons, Ltd., West Docks, South Shields, to the order of the Ilderton Steamship Company, Ltd., London (Messrs. Steel, Young and Co., managing owners), has been taken to sea on her official trial trip. The trial was in every way satisfactory. After the trial the vessel proceeded to Antwerp under the command of Captain Crooke to load part cargo for the West Indies. See Launches, March.

Leon y Castillo.—The new passenger and cargo steamer, *Leon y Castillo*, built by W. Harkess & Son, Ltd., Middlesbrough, to the order of Messrs. Elder, Dempster & Co., Ltd., of Liverpool, has recently completed a successful trial trip. A mean speed of 12½ knots per hour was maintained on a six hours' continuous trial. The owners were represented by their Chief Superintendent Engineer (Mr. J. B. Wilkie), who expressed his entire satisfaction with the results obtained. This is the first of two sister vessels the Company are building for this trade. See Launches, February.

Macedonia.—Recently, the twin-screw passenger steamer *Macedonia* which has been built by Messrs. Sir James Laing & Sons, Ltd., for the National Steam Navigation Company, Ltd., of Greece, has just undergone her speed trials. On the measured mile and during several hours' constant steaming an average speed of 18¾ knots was maintained. For Launch see November 1911 issue.

BOARD OF TRADE EXAMINATIONS.

NOTE. 1C denotes First Class: 2C Second Class.

February 22nd, 1912.

Boomer, J. .... 2C London
Burnett, T. .... 2C Cardiff
Butchart, E. .. 2C N.Shields
Davies, J. ..... 1C Cardiff
Dounie, R. .... 2C N.Shields
Duncan, A. .... 2C Glasgow
Earnshaw, R. .. 1C N.Shields
Flett, J. ..... 1C Liverpool
Greathead, A. .. 2C N.Shields
Griffiths, C. .... 2C Cardiff
Heslop, F. .... 2C Cardiff
Hobbs, J. ..... 2C W. Hart'l
Hughes-Jones, W. 1C N.Shields
Jacobs, C. .... 2C Glasgow
Jarvie, C. ..... 2C Glasgow
Jenkins, G. .... 1C London
Larrson, A. .... 1C W. Hart'l
Leddra, M. .... 2C Plymouth
Lewis, E. .. 2C Southton
Lumsden, J. .. 2C Glasgow
McCallum, N. .. 2C Cardiff
McFarlane, J. 2C Southton
McGeorge, G. .. 2C N.Shields
McInnes, J. .. 1C Glasgow
McIntyre, R. .. 1C Glasgow
McLeay, H. .. 1C Glasgow
McKendrick, A. 2C Glasgow
MacKinnon, A. 2C Glasgow
Mann, J. ..... 2C W. Hart'l
Marley, J. .... 2C Glasgow
Mercer, W. .... 1C Glasgow
Miller, J. ..... 1C Liverpool
Moncrieff, R. .. 2C Cardiff
Montgomery, S. 2C Leith
Newbold, W. .. 2C W. Hart'l
Nisbet, J. ..... 1C Leith
Pechell, J. .... 2C Southton
Pile, J. ..... 1C N.Shields
Ranson, H. .. 2C Southton
Robertson, T. .. 2C Leith
Robinson, J. .. 2C N.Shields
Scorer, J. ..... 1C N.Shields
Skinner, F. .... 1C Cardiff
Smith, H. .... 1C London
Spurrier, A. .. 2C Southton
Toppin, E. .... 2C Glasgow
Walker, A. .... 2C Glasgow
Williams, E. .. 2C Cardiff
Wiseman, G. .. 1C Glasgow
Yates, J. ..... 1C W. Hart'l

February 29th.

Anderson, J. .. 1C Sunderl'd
Arthur, J. .... 1C Aberdeen
Baxter, D. .... 2C Aberdeen
Cameron, A. .. 1C Aberdeen
Campbell, H. .. 1C N.Shields
Cole, W. ..... 1C Liverpool
Colquhoun, F. 2C Liverpool
Crombie, G. .. 2C Sunderl'd
Davies, D. .. 1C Liverpool
Davison, C. .. 2C Hull
East, A. ..... 2C N.Shields
FitzMahoney, G. 2C Liverpool
Forster, R. .... 2C Sunderl'd
Frankum, A. .. 1C London
Gillies, R. .... 1C Sunderl'd
Glennie, H. .... 2C Liverpool
Harrison, A. .. 2C Hull
Hatch, W. .... 2C Sunderl'd
Henderson, M. 2C Greenock
Inglis, A. ..... 2C Hull
Jesse, M. .... 1C London
Lockhart, J. .. 2C Londn'ry
Logan, G. .... 1C London
Love, W. ..... 2C Bristol
Lyson, M. .... 1C N.Shields
McAdam, A. .. 1C Greenock
McBride, T. .. 1C Londn'ry
McCaughin, W. 1C Liverpool
McLean, J. .... 2C London
Maitland, A. .. 2C Greenock
Mitchel, F. .... 2C N.Shields
Parker, T. .... 2C Hull
Pigott, J. ..... 2C N.Shields
Ralston, A. .... 2C Liverpool
Richardson, W. 2C Liverpool
Ritches, W. .. 2C Sunderl'd
Ritchie, W. .. 1C Greenock
Robertson, J. .. 2C Aberdeen
Rogers, G. .. . 2C Liverpool
Ryland, E. .... 1C Hull
Sampson, T. .. 1C Liverpool
Shaw, F. ..... 2C Liverpool
Smith, J. .... 2C Aberdeen
Taylor, W. .... 1C Greenock
Thornton, J. .. 2C Sunderl'd
Varian, A. .... 1C Liverpool
Vickers, H. .... 2C Hull
Walker, J. .... 1C N.Shields
Watchorn, G. 2C London
Waters, J. .... 2C London
Williams, I. .. 2C Bristol

March 7th.

Adams, A. .... 1C Liverpool
Aitken, J. ..... 2C London
Angus, R. .... 1C Glasgow
Atkinson, J. .. 1C N.Shields
Beeny, W. .... 1C Cardiff
Black, P. ..... 2C Glasgow
Bryan, A. .... 1C Glasgow
Campbell, J. .. 2C Glasgow
Carlson, C. .... 1C Cardiff
Clark, R. ..... 1C Liverpool
Corrie, J. ..... 2C Glasgow
Cox, A. ..... 1C Cardiff
Cran, H. ..... 1C Leith
Crittors, R. .... 1C Belfast
Dent, E. .... 2C N.Shields
Dixon, J. ..... 2C N.Shields
Drysdale, R. .. 2C Liverpool
Duncan, J. .... 2C Leith
Eggleston, T. .. 1C N.Shields
Farthing, C. .. 2C London
Fockett, F. .... 2C London
Frith, H. ..... 1C London
German, F. .... 2C Liverpool
Gilleland, J. .. 2C Liverpool
Green, W. .... 2C Cardiff
Hall, M. ..... 1C London
Harper, S. .... 1C Liverpool
Harrison, R. .. 1C Cardiff
Henderson, A. 2C Leith
Heward, H. .... 2C Liverpool
Hope, J. ..... 2C N.Shields
Johnston, I. .... 2C Belfast
Jones, L. ..... 2C Liverpool
Lawrence, G. .. 2C London
McCartney, H. 2C Liverpool
McPherson, W. 1C Glasgow
McWhirter, J. .. 2C Belfast
Mansfield, R. .. 2C London
Marsh, R. .... 1C N.Shields
Marshall, L. .. 2C N.Shields
Martin, J. .... 2C Glasgow
Mitchell, R. .. 2C Liverpool
Morris, T. .... 1C Liverpool
Oswald, G. .... 2C Glasgow
Pallant, E. .... 2C N.Shields
Park, W. ..... 2C Glasgow
Parry, E. .... 1C Liverpool
Paterson, A. .. 2C Glasgow
Paterson, J. .... 1C Leith
Pender, F. .... 1C South'ton
Phiampolis, P. 1C Cardiff
Pollock, W. .... 2C Glasgow
Preston, F. .... 1C Cardiff
Richards, S. .. 2C Falmouth
Richardson, T. 2C N.Shields
Roberts, G. .... 2C Liverpool
Scatchard, O. .. 1C N.Shields
Skinner, W. .... 1C Glasgow
Spears, G. .... 2C London
Stephen, W. .. 2C Glasgow
Sumner, B. .... 1C Liverpool
Thomas, G. .... 2C Cardiff
Tod, W. .... 1C Leith
Underhay, S. .. 1C Liverpool
Watt, C. ..... 2C N.Shields
Williams, E. .. 1C Liverpool
Windle, T. .... 2C Liverpool
Wilson, P. .... 2C Belfast
Wood, T. ..... 1C Leith

March 14th.

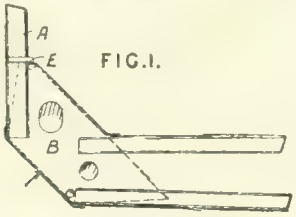
Allison, G. .. 2C N.Shields
Bain, R. ..... 1C N.Shields
Bell, O. ..... 2C N.Shields
Boyd, John .... 1C London
Boyd, James .. 2C Greenock
Brown, H. .... 2C Liverpool
Bates, G. .. 2C Hull
Campbell, G. .. 1C N.Shields
Cannell, J. .... 1C Liverpool
Collier, J. .... 1C Hull
Cran, A. .... 1C Dundee
Cuthbert, A. . 2C Hull

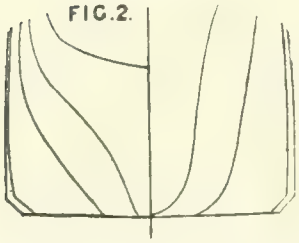
Flood-Jackson, G.	1C Liverpool	McLaren, D.	2C London
Gubbien, P.	1C Hull	Miller, H.	2C N. Shields
Gray, W.	2C Greenock	Patterson, R.	2C Dublin
Hayward, J.	1C Liverpool	Penney, W.	2C Liverpool
Henderson, M.	2C London	Purcell, W.	1C Liverpool
Hewitson, T.	2C Liverpool	Quincey, N.	1C Liverpool
Hewitt, W.	1C Liverpool	Roberts, C.	2C London
Hughes, F.	1C Liverpool	Robinson, D.	2C N. Shields
Hughes, J.	1C Liverpool	Smart, W.	2C N. Shields
Jones, A.	1C London	Southwood, W.	2C Liverpool
Kay, W.	2C N. Shields	Stone, W.	2C London
McCaffrey, J.	2C Greenock	Strother, P.	1C N. Shields
McCartney, A.	2C Greenock	Sturgeon, C.	2C London
McColl, J.	2C Greenock	Swapp, J.	2C N. Shields
McGregor, J.	2C Dundee	Williams, H.	2C Liverpool
McKay, H.	2C Dundee	Wilson, N.	2C N. Shields

The Marine Engineer and Naval Architect Patent Record.

Compiled by Messrs. E. P. Alexander & Son, Chartered Patent Agents, 300, High Holborn, London, W.C.

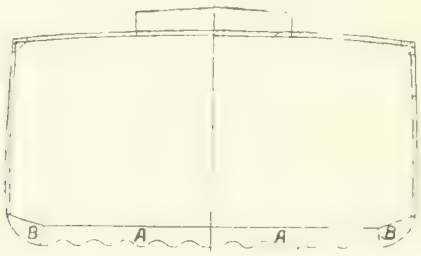
25,697. Framing, Tanks and Hulls of Ships. Comprises a construction of passenger or cargo-carrying vessels whereby the amount of furnace-work is reduced. The frame A is carried down through the tank-top, and is secured to the





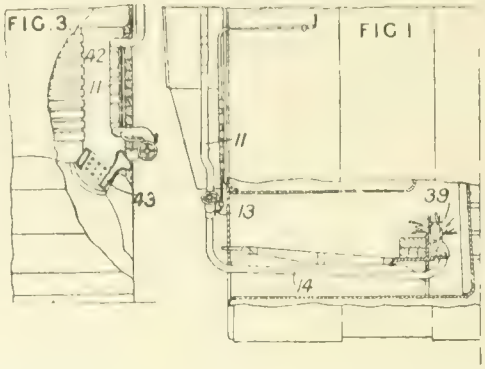
bracket-plate B and to the shell-plating. Water-tightness is ensured by means of a collar E. The form of the vessel is that shown in Fig. 2, whereby the described construction is facilitated.

26,036. Hulls, Floors, and Tanks of Ships. The bottoms of hulls are constructed with a series of longitudinal corrugations running the whole length of the vessel. The floors A



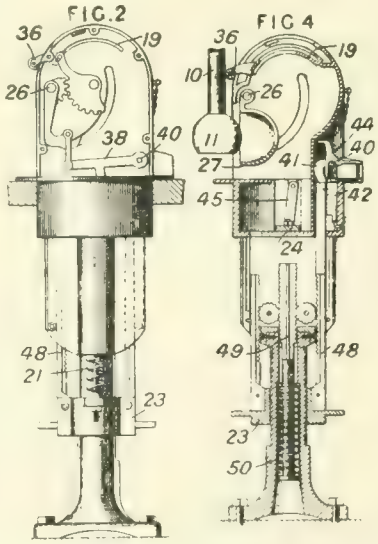
are cut on their undersides to fit the corrugations, and the tank-tops are extended to form wing-tanks B so that the tank capacity is not reduced by the corrugations.

26,234. Furnaces. In the furnaces of marine or Cochrane boilers, air for smoke-consuming purposes is supplied to suitably-situated perforated chambers by steam jets through heating coils arranged in the uptake or the combustion chamber. As shown in Fig. 1 in connection with a marine boiler, air is drawn through coils 11 in the uptake by a steam



jet 13, and is delivered through pipes 14 in the ash-pit to a perforated box 39 behind the bridge. As applied to a Cochrane or vertical boiler, Fig. 3, the coils are arranged in the chamber 42 between the furnace and the smoke tubes of the boiler, and the air is delivered through an annular perforated casing 43.

27,179. Boat-disengaging Gear. A headed-hanger attached to the falls takes into a socket member pivoted to a stand secured to the boat. The socket member rotates to eject the hanger when the boat is water-borne. The head 11 of the hanger 10 is engaged with a socket 27 pivoted at 26. The socket is linked up to a forked lever 38 pivoted at 40 and connected by a link 45 with a vertically-guided yoke 24. A treadle 23, guided on the foot of the stand, is connected to the yoke 24 by springs 21. Racks 48 secured to the treadle are geared up to a central rack 49 controlled by a compression spring 50. One of the racks has an extension



which normally holds up a spring-controlled trip-lever 44. When the boat is to be disengaged, the treadle is depressed, causing the racks 48 to descend, and allowing a trigger 42 to spring forward and engage the top of the rack. As soon as the boat is water-borne, the yoke 24 can descend and rotate the socket 26 to eject the hanger 10. Simultaneously, fingers 41 come round to press back the trigger 42, and allow the racks, etc., to move back to their normal positions. The expulsion of the hanger is further ensured by a nose 36 working in a segmental slot 19 and geared up with the shaft 26. A locking-piece is provided to prevent accidental operation of the gear.

The Marine Engineer

And Naval Architect.

LONDON, MAY, 1912.

THE LOSS OF THE "TITANIC"

THE unlooked-for disaster which overtook the largest ship in the world on her maiden voyage on a starlit night and in a calm sea, has staggered humanity, as no one, however expert, would have predicted—when the *Titanic* left Southampton on April 10th, and given the atmospheric and ocean conditions that obtained—the probability of her lying in mid-Atlantic submerged in two miles depth of water before the dawn of April 15th. That some of her officers realized the seriousness of the situation after the collision with the iceberg is quite evident from what they did, while other officers and a large number, if not all, the ordinary passengers had the fullest confidence in the unsinkability of the ship until the very last and just before the final plunge headfirst to the bottom of the sea, otherwise it is impossible to understand the continuance of card playing and other amusements for so long after the collision. The hearts of the people of two great nations have been stirred to the depths in genuine sympathy for those who have been bereaved through the death of over 1,600 persons without warning and under the most tragic circumstances. It can be truly said that the loss of the *Titanic* is the most stupendous marine disaster the world has ever known, and the history of the catastrophe, so far as is at present ascertained, baffles the wildest description of any fiction that we have ever read. It is clear that every step will be taken in this country to probe the whole matter to the bottom, and we feel sure that this investigation will be conducted in a more thorough, judicial and businesslike manner than appears to characterise the proceedings of the Committee of Enquiry now sitting in the United States of America. The British Government are to be congratulated on the despatch and business method adopted in the steps they have taken already, and the public can confidently wait for the result, with the knowledge that after the fullest investigations have been made and any blame is attributable, such blame will be put on the proper shoulders. The tales of heroism and self-sacrificing devotion stand out clearly in this terrible disaster as characteristic of the two great English-speaking nations, and no finger of scorn can be pointed with reference to the deck officers of the ship, or to the passengers, many of whom were the richest of the community, as to the manner in which they did their utmost to assist others in the face of certain death themselves. Captain Smith went down with his ship as a brave man, after everything had been done by him for others, and those who had the privilege of knowing him felt quite certain that he did exactly what they would have expected of him. However much one can admire the courage and heroism of those on deck in the hour of trial, where they can have some knowledge of what is going on, how much more should one appreciate the devotion to duty and the self-sacrifice of those down below in the bowels of the ship, exerting themselves to their utmost to keep the ship afloat, and maintaining everything in a going condition for the benefit of those above. It must be recognised that they of all people knew from the internal conditions what the end must be, and yet they struggled on in spite of the awful death that awaited them. The fact that the whole of the members of the engine room staff of thirty-five, of whom fourteen held chief engineer's certificates and eight second engineer's certificates, went down with the vessel, is eloquent testimony of their manly devotion to duty under terrible circumstances. In matters of this kind in the ordinary course, one seldom hears of the proper appreciation given to the responsibilites and devotion to duty exhibited by marine engineers in accidents at sea, and it is satisfactory to know in the present instance that these have not been lost sight of, as may be exemplified by the eloquent letter of Lord Charles Beresford in the "Times," which has been followed by other letters in various directions. It is a great satisfaction to us that through the kindness and consideration of relatives and friends we are able to give portraits and particulars of a large number of those who have nobly and honourably sacrificed themselves on the altar of duty, and while our deepest sympathies are extended to those who have suffered irretrievable losses, yet at the same time we feel proud to be associated with a class of men who have shown their courage in carrying out their duty in the face of death for the benefit of others who had a chance of escape, while they had none. Long may this high sense of duty and devotion be a characteristic of our marine engineers in the discharge of their important responsibilities for the credit of themselves and the honour of the nation that claims them as citizens.

SUPERHEATING IN MARINE BOILERS

IN our last issue we reproduced the paper read by Mr. H. E. Yarrow at the Institution of Naval Architects, as it forms a very valuable addition to our stock of knowledge on steam boilers, and we are sure that those who were present at the meeting and heard the discussion must have been impressed with the favourable views of superheating put forward. It may be said that for the past forty years superheating has been out of favour with marine engineers as a body, owing to a large extent to the want of durability of the superheaters originally used. Great economies have been shown for many years past on land engines

and more recently on locomotives with superheated steam, and it would seem that in marine work the steam turbine will again bring the superheater into prominence. The Hon. Sir C. A. Parsons pointed out that the experiments described were the first to record a thorough investigation into the drop of temperature across the tubes of a water tube boiler, so that the actual evaporation in each row of tubes could be deduced from the specific heat of the gases and the drop in temperature. The ascertaining of the ultimate limit of resistance of a thin tube would be useful in defining how far boilers could be forced, particularly in the case of warships. In the case of the *Turbinia* Sir Charles stated that the steam evaporation was about 28 lbs. per square foot of heating surface, and the tubes near the fire would probably be evaporating about 80 lbs. per square foot, but no damage had resulted up to that point, and the economy was very poor indeed. Taking the rates of evaporation given in the paper Sir Charles pointed out that with a well-designed high-pressure steam plant, and 200 degrees of superheat the consumption, especially in the case of geared turbines, would be about ·75 lb. of oil per shaft horse power, compared with ·442 for the Diesel engine, showing that the Diesel was nearly twice as efficient as the steam engine running with superheated steam. A very useful contribution to the discussion was made by Mr. Marriner in reference to the uptake temperatures above the superheater, which were consistently below the temperature at the upper side of the large nest of tubes, although the superheater had only ten rows of tubes in it to pick up the heat, plus the twelve generator tubes, and on the other side of the boiler there were eighteen rows of tubes, although the two outside tubes were used for feed-water heating. This indicated the efficiency of the superheater in taking up the heat from the gas outside the tubes, and transferring it to the gas inside the tubes. Not only was feed heating by exhaust gases economical, but a large increase in the life of the boiler was clearly shown. From the experiments it was demonstrated that superheated steam of 100 degrees above the temperature of saturated steam could be easily used with turbines, or with well-made auxiliary machinery. At full power 10 per cent. economy was obtained with such superheated steam, and at less powers Mr. Marriner anticipated 20 per cent. Mr. Rosenthal, who had had twenty years' experience with superheating, gave the results of the comparative tests made on *H.M.S. Britannia*, which had eighteen Babcock and Wilcox boilers, only six of which were fitted with superheaters so that it was possible to make reliable comparative tests as to efficiency with a certain horse power of the engines between boilers fitted with superheaters and those not so fitted. The degree of superheat was 83° Fahr. and the advantage obtained was 15 per cent. As far as his experience went Mr. Rosenthal gave his opinion that the temperature to which it was best to go in order to retain all the advantages and have none of the disadvantages of superheaters was a limit of 600° Fahr., if the ordinary materials obtained in commerce be used.

RELATIVE POSSIBILITIES OF POWER SYSTEMS FOR MARINE PROPULSION.

At the beginning of last month an extremely interesting discussion took place at a meeting of the North-East Coast Institution of Engineers and Shipbuilders on the relative possibilities of the Diesel oil engine, the geared turbine and suction gas engine, as compared with the reciprocating steam engine, for marine propulsion. To form the basis for the discussion short papers were read on the Diesel Engine by Mr. E. L. Orde, on Geared Turbines by the Hon. Sir C. A. Parsons and Mr. R. J. Walker, and on the Suction Gas Engine by Mr. A. C. Holzapfel. Taking the papers in order, Mr. Orde sets out to show to what extent the earning power of a cargo vessel is affected by the adoption of the Diesel engine, and to do this in a simple manner he submitted two outline plans showing respectively a shelter-deck cargo steamer of known type, and the same vessel re-arranged and fitted with Diesel engines. 3,500 mile tons is taken as a fuel unit for the cost of working, as this represents a fair average voyage, and the bunkers in both vessels are arranged accordingly. The cost of the oil engine ship is £78,000, and of the steam ship is £63,000, and taking oil at 40s. per ton and coal at 15s. per ton, the cost of fuel per voyage is £360 and £445 respectively. Taking insurance, fuel, wages, provisions, wear and tear, deck and engine-room stores and port charges at 5s. per ton, the cost of running per voyage is £1,115 and £1,180 respectively. Again, in dealing with the freight-earning cargo capacity over a series of voyages, the cost per ton is 61·4 pence and 65·2 pence respectively, so that on these figures the oil engine ship, although costing more, can be worked for less money and will carry more cargo. The diagram and tables included in the paper are worthy of the careful attention of those interested in the subject, and if the owners of the *Selandia*, who have hitherto treated the public very generously with regard to giving information, would give some details as to the cost of running this vessel, which has recently reached Bangkok on her trial voyage to the East, such information would be particularly useful in considering the propositions set forth.

Dealing now with the second paper on geared turbines, the authors state that the principal advantages of geared turbines as compared with triple-expansion engines comprise: Increased economy in coal and oil consumption, absence of racing in rough weather, reduced wear and tear of engines,

reduced stress on screw shafting, due to the even turning movement of the engines and absence of racing, reliability of running in all weathers, reduced weight of machinery, and increased dead-weight cargo due to increased economy in coal consumption and reduced weight of engines. The *Vespasian* experiment showed an advantage of 15 per cent. for the turbine geared engine over the reciprocating engine, but it was said by some that the latter did not represent the best triple-expansion type, while others thought the performance very creditable. It is pointed out by the authors that the result of the turbine engines is not the best that can be obtained. The geared turbine ship *Normannia*, of 5,000 horse-power, divided over two shafts with a high and a low-pressure turbine on each shaft, gave on trial a steam consumption of 12 lbs. per shaft horse-power as compared with the estimate of 12½ lbs. The advantages of superheating open up a useful field for economy, as a saving of 1 per cent. can be obtained on land for every 10 degrees of superheat. The authors point out the advantages of liquid fuel, which has been demonstrated in certain classes of vessels, and the reduction of cost obtained thereby. With reference to the wear of teeth and the reliability of the machinery generally, which have been advanced as objections, it is pointed out that the *Vespasian* has done some sixty-two voyages from the Tyne to the Continent, aggregating 37,000 miles, and although some exceptionally rough weather has been experienced, especially when steaming in light condition, one of the most remarkable features in her running has been the freedom from racing in the engines, while the gearing has given no trouble, nor has any appreciable wear been detected in the teeth of the pinions or gear wheels since she was first put on service about two years ago. In the third paper Mr. Holzapfel gave particulars of a vessel of 11,560 tons displacement and 2,600 I.H.P., and to have a speed of 10½ knots. The cost of the installation of four producers and two sets of engines of 1,400 B.H.P. each would be £16,700. As regards fuel consumption the author claims that it is by far the most economical motive power for ships; secondly, that by its use in conjunction with electrical auxiliary machinery great economy in fuel consumption will be effected; and thirdly, that although the cost at present is about equal to or somewhat in excess of a steam installation, the development, which will certainly take place, will reduce the cost by reason of the standardization of manufactures which will be carried out.

THE SMOOTH-ON MANUFACTURING CO., of Jersey City, N.J., U.S.A., have sent us a copy of their Instruction Book No. 11, dealing with Smooth-on Concrete Iron Cement No. 7. This cement is used for repairing leaks in concrete, waterproofing, etc., and the instruction book tells all about it, giving illustrated examples. The high-class nature of Smooth-on products is well known and those interested should get into communication with the company, who will be pleased to send copies of their booklets to enquirers.

LETTERS TO THE EDITOR.

To the Editor of THE MARINE ENGINEER & NAVAL ARCHITECT.

The "Titanic" Disaster.

It suggests itself to many that the [illegible] of the engineers of the *Titanic* [illegible] in the public press, while the fact of [illegible] engineers being saved needs but little comment as to their devotion to duty. It is mentioned that the vessel sank with lights burning and Mr. Bell, the chief engineer, [illegible] replied he thought the pumps would keep the vessel afloat; this indicates that [illegible] made to [illegible] but unfortunately without avail. While in no way [illegible] and discipline in other departments, the devotion to duty on the part of the engineers [illegible] in saving a much worse [illegible] which would have occurred if the electric light had failed and the ship sunk earlier, and I would suggest the names of the engineers of the *Titanic* be embodied in some suitable memorial. There is a letter from Lord Charles Beresford in the *Times* on the heroic behaviour of the crew under deck, but this is general and does not convey the full meaning of self-sacrifice to duty by the engineers, which meant safety for so many others. When the mail sorters of the United States and this country are making a special observance of the loss of four of their members in standing by the mails, I think we should be failing in duty to allow the engineers' action to pass unnoticed. It may be observed that many similar cases might be cited of the whole of the engineers being left at the post of duty while the other departments were in a position to save themselves, and even remained at their posts after others had sought safety in the boats, thus taking the final chance of all.

PALINURUS.

London, E.C., 22 April, 1912.

To the Editor of THE MARINE ENGINEER & NAVAL ARCHITECT.

Sir,—It is more pleasing to receive spontaneously from studious onlookers a testimony as to their appreciation of duties discharged in situations of difficulty and danger, than to have occasion to call attention to an apparent lack of rendering honour to whom honour is due. The letter by Admiral Beresford to *The Times* is couched in such terms that it has afforded considerable gratification to those who understand and realize what it means to "stand by" below at the post of duty and try to keep the machinery going to the end in the hope that those on deck may have the last chance of safety—at the same time placing reliance on the deck officers to give due warning when such becomes necessary that the final stand for those who are left is not below, but on deck, where perhaps there is safety, or, if not, at least a prospect of facing death in the open rather than in the narrow confines of the engine-room and stokehold.

It is given to but few to know by experience what it really means to call forth the expressions set before the public in the press when commenting upon the unhappy loss of the *Titanic* and the heroism displayed by those whose sense of duty rose to the occasion, and animated them to display coolness and valour in the face of danger. It is an experience the memory of which keeps green throughout a lifetime, and, while those who officer and man the deck department are worthy of honour and praise when in situations of peril on the sea, they upheld the dignity and courage of manhood; those who officer and man the engine department, where the vital elements of progress and safety of flotation lie, are quite as worthy, with this added, that their fight for life is against greater odds and therefore more desperate. The tributes now being offered to the memories of the engineers and their staff have come after the pleasure of praise sung to the spirits of those who were made in the light of public observation, and though the tributes may not reach the ears of the engineers of the *Titanic* and their staff, it is an act of justice to the living to tender a due appreciation of the valiant stand made by those who are gone and place on record a memorial of the services they rendered in the cause of humanity and of the sacrifices they made in the interests of duty—though unseen they made their presence felt by the giving of light until the overwhelming mass of water engulfed both ship and men.—Yours faithfully,

JAS. ADAMSON,

Hon. Secretary, Institute of Marine Engineers.

58, Romford Road, London, E., 24 April, 1912.

To the Editor of THE MARINE ENGINEER & NAVAL ARCHITECT.

This *Titanic* disaster appears to be a most frightful calamity and as you can imagine has really put this town into mourning, so many people having lost their relatives. I notice that the papers comment very freely upon the bravery of the deck staff but I do not see any mention of the engineers, who I am sure died heroically at their posts. Having been a shipmate of many of those who have gone, I might say without any hesitation they were brave and noble men, and as you can imagine, when I read of everyone else being spoken of as heroes, it touches me very deeply to think that no mention of my cloth is made.

SENIOR ENGINEER.

Southampton, 20 April 1912.

To the Editor of THE MARINE ENGINEER & NAVAL ARCHITECT

Dear Sir,—At the meeting of the Naval Architects, which was recently held, Mr. Harold Yarrow read a very interesting and instructive paper on the results of experiments with a water-tube boiler with a special reference to superheating. Owing to the shortness of time open for discussion I regret I was unable to take part. There are one or two points which I should like to refer to, firstly, with regard to the damper arrangement described for controlling the superheat in the Yarrow boiler, and, secondly, the effect of the adoption of superheated steam when applied to certain auxiliary machinery on torpedo-boat destroyers.

During the last ten years we have had experience in our power-house in working four of Messrs. Babcock & Wilcox's boilers. Each boiler is constructed for 300 lbs. of steam and each fitted with a horizontal U-tube superheater.

The average working pressure, however, has seldom exceeded 230 lbs., and the average steam temperature recorded daily varies between 435 deg. Fahr. and 485 deg. Fahr., according to the load on the boilers.

We have experienced little or no trouble with these U-tube superheaters and no accident due to the tubes becoming overheated.

Last year a new Babcock & Wilcox boiler of the three-drum land type was installed, and has recently been put into operation. This boiler is also fitted with a horizontal U-tube superheater and provided with a horizontal damper the width of the whole boiler similar to that shown in Fig. 1 of Mr. Yarrow's paper. This damper is controlled by hand in such a way as to prevent any of the gases passing through the superheater when saturated steam is required, the damper being closed if superheated steam is necessary. It is a very simple arrangement and we have found the damper to be of the greatest use and advantage, and it enables us to control the superheat from 0 to 150 degs. Fahr. Up to the present time we have not had any trouble due to overheating or going out of shape. The damper is constructed of cast iron.

With regard to the suggestion of adopting superheated steam for the auxiliary machinery, such as high-speed forced lubrication engines for electric light machinery, circulating pumping engines and fan engines, I see no objection, provided that every care is taken in the design of the steam cylinders and in the selection of the materials used, which is of the first importance.

The experience which we have gained by the use of superheat with steam pressure up to 220 lbs. and with a total temperature of 550 degs. Fahr. in connection with reciprocating engines of various types and sizes for land purposes, has been in every way satisfactory.

Mr. Harold Yarrow mentions the percentage of saving in steam consumption by the use of superheat, and from the results of the many steam consumption trials we have carried out with reciprocating engines I can confirm these figures.

I trust the effect of Mr. Harold Yarrow's paper will be the adoption in the near future of superheated steam in marine work.—I am, yours faithfully, RICHARD W. ALLEN.

Queen's Engineering Works, Bedford, 15 April, 1912.

(Mr. Harold Yarrow's paper was reported in the April issue of *The Marine Engineer and Naval Architect*, pages 338-341. ED.).

MARINE CIRCULATORS, of 118, Leadenhall Street, London, have secured the contract to install the Ross-Schofield Circulators on all the boats of the Holland-America Line.

THE VELOCITY OF STEAM.

WHEN high-pressure steam escapes freely into a region of lower pressure expansion takes place and a portion of the heat energy originally possessed by the steam is transformed into kinetic energy of motion, *i.e.*, the steam does work upon itself by virtue of its heat energy and propels itself with a very high velocity through the escape into the region of lower pressure. If there is no gain or loss of heat to external sources while passing through the escape, expansion is said to be adiabatic and we generally assume for convenience in calculation that this is so. With adiabatic flow the ordinary thermodynamic laws enable us to calculate the maximum velocity attainable by the steam.

Let P_1 be the initial pressure in pounds per square inch absolute and P_2 the final pressure. Let V_1 be the volume per pound of the high-pressure steam assumed to be quite dry at pressure P_1 (taken from the Steam Tables). Then we want to find V_2 the actual volume per pound of the wet steam at P_2 after expansion. Turn the pressures into pounds per square foot and then use the equation.

$$P_1V_1^n = P_2V_2^n \quad \ldots \quad \ldots \quad \ldots \quad (1)$$

taking for N Zeuner's value of 1·135. This gives us V_2. Then find the work done in foot pounds per pound of steam during expansion from the formula

$$\text{Energy liberated in foot pounds} = \frac{P_1V_1 - P_2V_2}{N-1} \ldots (2)$$

Then get the maximum velocity of the steam in feet per second from the formula

$$\text{Velocity} = \sqrt{2g\,(\text{Energy liberated in foot pounds})} \quad (3)$$

in which g = acceleration due to gravity = 32·2 feet per second per second.

We could have solved this problem by using heat quantities only. Let T_1 be the absolute temperature in degrees Fahrenheit of the steam at pressure P_1 (this is obtained by adding 461° to t_1) and let T_2 be the absolute temperature at P_2, the ordinary temperature being got from the Steam Tables. Let L_1 be the latent heat per pound of dry steam at P_1 (from the Steam Tables), then

$$\left.\begin{array}{l}\text{Energy liberated in British}\\ \text{Thermal Units per pound}\\ \text{of steam} \quad \ldots \quad \ldots \quad \ldots\end{array}\right\} = \begin{array}{c}(T_1 - T_2)\left(\frac{L_1}{T_1} + 1\right) - \\ T_2 \log_e \frac{T_1}{T_2}\end{array} \ldots (4)$$

and to find the maximum velocity attainable we have to multiply by 778 to convert the British Thermal Units to foot pounds, hence

$$\text{Velocity} = \sqrt{2g \times 778 \times (T_1 - T_2)\left(\frac{L_1}{T_1} + 1\right) - T_2 \log_e \frac{T_1}{T_2}} \quad (5)$$

or

$$\text{Steam Velocity in feet per second} = 223{\cdot}8\sqrt{(T_1 - T_2)\left(\frac{L_1}{T_1} + 1\right) - T_2 \log_e \frac{T_1}{T_2}} \ldots (6)$$

This is the formula most generally used for accurate calculations. It is, however, not by any means a simple expression to handle and it will be of interest to marine engineers to know that there is a simpler expression deduced from the properties of steam, which is capable of application to the case of steam expanding from a high pressure right down to a vacuum of 28 inches of mercury.

Let θ be the drop in temperature between P_1 and P_2, *i.e.*, let $\theta = (t_1 - t_2)$, then the approximate formula is

$$\text{Steam Velocity in feet per second} = C \sqrt[n]{\theta} \ldots (7)$$

For the case of high-pressure steam at an initial pressure of 150 pounds per square inch absolute $C = 211{\cdot}7$ and $N = 0{\cdot}526$.

This approximate formula is correct within less than 2 per cent. of the true value through the whole range as illustrated in the following table:

THE VELOCITY OF STEAM EXPANDING ADIABATICALLY FROM 150 LBS./INS. (ABSOLUTE) PRESSURE.

Steam Temperature in degrees Fahrenheit	Steam Pressure in pounds per square inch (absolute)	Fall in Temperature during adiabatic expansion °F θ	Velocity generated, in feet per second.	
			By adiabatic formula	By approximate formula.
358·3	150	0	0	0
347·2	130	11·1	763·1	750·6
334·6	110	23·7	1123·5	1118·8
320·3	90	38·0	1425·6	1434·5
302·8	70	55·5	1736·7	1742·7
292·6	60	65·7	1897·6	1913·3
281·0	50	77·3	2065·7	2084·0
267·0	40	91·3	2258·1	2273·6
250·5	30	107·8	2464·0	2481·1
240·5	25	117·8	2578·2	2599·7
228·0	20	130·3	2725·9	2741·5
213·1	15	145·2	2891·5	2902·4
193·3	10	165·0	3099·6	3105·6
183·0	8	175·3	3202·8	3205·1
170·1	6	188·2	3332·6	3327·9
153·1	4	205·2	3498·0	3482·5
141·6	3	216·7	3607·6	3584·1
126·4	2	231·9	3748·6	3713·2
102·0	1	256·3	3972·4	3914·3

BREAKDOWN EXPERIENCES.

AT a recent meeting of the Junior Institution of Engineers a short paper on "Breakdown Experiences" was read by Mr. G. L. Morty. In the course of his remarks Mr. Morty said that when journeying from Buenos Ayres to Liverpool on the s.s. *Urmston Grange*, the bottom of the circulating pump dropped out, being eaten away by corrosion. It was repaired by cutting a hatch cover to the diameter of the barrel, and fixing with cement mixed with sea water; but the repair only lasted a few minutes. After chipping out the cement, the pump was again repaired with the cover and cement mixed with pitch and tar to make the cement elastic; but this only lasted about six hours. The repair was finally done by putting plates top and bottom to wooden cover, with red lead between the wood and cast iron, and bolting the lot together. This was satisfactory, and lasted the voyage.

On another occasion, while on the s.s. *Nile*, the Worthington pump valve-chest fractured in several places. This was, in the first place, patched up with butterfly patches, but, being found unsatisfactory, a wooden box was built around the whole chest and filled with cement.

On the same steamship the L.P. double-ported slide valve broke. On examining the valve the top bar was found to be missing, and a big part of the body of the valve. A repair was made by fitting an angle iron for the top bar, and fitting a piece of plate from the angle iron to the body of the valve, covering the place which was broken. This lasted for some time, but broke again; so the valve was taken out and the engine worked compound to Buenos Ayres. At that port some gun-metal castings were made for the top, bottom and exhaust bars, also some of the bars on the cylinder face. They were fitted, chipped and filed flush, making a satisfactory job, being able to go ahead full speed. After the first breaking of the L.P. valve, the eccentric, or intermediate crank-shaft, was examined. The eccentric was taken off, and it was found that the crank-shaft had a bad fracture in the fillet next to the coupling. This shaft had to be taken out and a new one fitted, and a keyway cut for the intermediate and L.P. eccentric.

The crank-shaft of a fan on another steamship fractured through crank. That was repaired by welding a ring and shrinking on crank, then boring and tapping a few ½-inch holes, screwing in studs and riveting over.

A main steam pipe that had fractured in the fillet close to flange was repaired by taking out the gland ring, which is in two halves, and fitting over fracture. The joint was made by red lead, the gland fitted over and held to flange by six long bolts, the whole finally being clipped over with a clip made in two halves. That was very satisfactory, and the boat steamed home on full pressure.

The joint between an air pump and condenser gave out on another steamship. That was repaired, as there was no time to take to pieces and rejoint, by making patches to fit inside, covering joint, drilling and tapping about three dozen holes, and making red lead joint under patches and bolting down.

A refrigerating plant, which was frozen up by some foreign matter getting in circuit, was cleared by first of all taking out the two discharge valves on the compressor, and pouring in about a pint of methylated spirit, boxing up, and running machine slowly to pump spirit through system. That was repeated a few times—a quart of spirit at a time—till the whole system was thoroughly clear.

THE Cunard liner *Aquitania* is making good progress towards the launching stage, and it is expected that the vessel will be launched towards the end of the present year.

AT the Institution of Mechanical Engineers on April 19th the tenth report was read by Dr. Walter Rosenhain and Mr. S. L. Archbutt of the National Physical Laboratory, Teddington, to the Alloys Research Committee on the alloys of aluminium and zinc.

A CLUB has been recently opened in Rotterdam for the special purpose of promoting social intercourse between British subjects in Rotterdam. The club, which bears the name of the Georgian Constitutional Club, has its premises in spacious rooms of the Grand Café Restaurant "Suisse." The club has a private entrance in the Weststraat.

THE LOSS OF THE "TITANIC."

A FORTNIGHT ago such a heading as the above would have struck our readers as absurd—"the *Titanic* was unsinkable, and her loss at sea was impossible." So thought her builders and owners, so thought the general public, and so, mercifully enough, almost up to the last, thought the great bulk of the 2,340 persons who, under apparently the happiest auspices, left Queenstown in her on the 11th April. Yet, on the forenoon of Monday, the 15th April, Britain was startled by the poster "*Titanic* sinking." The evening papers told us she had sustained serious injuries by running into an iceberg, but that *no lives were lost*. Even on the morning of Tuesday, the 16th, *The Times*, on the authority of Reuter, published a telegram: "The *Titanic* sank at 2-20 this morning; no lives were lost." In spite of indignant denials that she could not sink, the world had to realize that she had indeed sunk, though it comforted itself with the second clause that there had been no loss of life. Slowly and gradually did the news percolate through till, on the arrival at New York of the *Carpathia*, on the night of Thursday, the 18th, the cold, awful truth was forced upon the world that 1,635 lives had been lost by the disaster. It is only as one sits down to write a collected connected story—as far as may be possible from the conflicting mass of materials that has been published—that on the Monday we were told by those who had it from "someone at Lloyd's" that 1,700 lives had been lost. With what incredulity did we tell our informant that that *must* be wrong, *The Times* said there was no loss of life, and now there could not be any as the passengers were all aboard the *Carpathia* and *Parisian* whilst the White Star transmitted a message that the *Virginian* was towing the disabled vessel towards Cape Race. Now how was it that this practical truth was known at Lloyd's four days before the public had the facts laid before them, and how was it that all these false statements were circulated in the press? These are questions which will have to be thoroughly sifted and truly answered. Something of the muddle is no doubt due to the perfervid imagination of the American reporter, and something to the confusion of wireless messages, which is due to the absence of any restraint upon amateur installations on the other side. The United States reporter is beyond regulation, but the wireless amateur will assuredly be restrained in future as one result of this awful tragedy. Speaking of wireless, it is well here to remark that when the *Carpathia* took the *Titanic's* call for aid the operator was just turning in for the night—another ten minutes and the cry had fallen on a deaf installation, and the tale of death and suffering would have been augmented by the tragedy of death and starvation of women and children in the water. So, too, the *Parisian* might have been called up had her operator been on duty, but the call came to her when the one telegraphist had turned in. It should be explained, however, that the *Parisian*, even if she had received the call, could not have come up in time to have saved any lives that were not saved by the *Carpathia*. Clearly one lesson of the tragedy is that the watch in the wireless room of ships at sea must be continuous.

Now let us turn to the story of the wreck itself. There appears to have been an ice field unusually far south for the time of year. On her eastward voyage this field was encountered by the French liner *La Touraine*, which ran into it at midnight on Wednesday, the 10th April, in lat. 44·58 N., long. 50·40 W. She was an hour and a quarter passing through it. Next day, at 6 a.m., she passed to the south of another field, and also saw two icebergs, getting clear about three-quarters of an hour later. On the afternoon of the 12th April, *La Touraine* was for some hours in wireless communication with the *Titanic*, aud apprised her of the existence and position of the ice. On the 14th April—the very day of her disaster—the Washington Hydrographic Office received, through the *Titanic's* installation, a report from the liner *Amerika* to the effect that she had passed two large icebergs in lat. 41·27 N., long. 50·03 W.

Nothing to interfere with the success of the voyage occurred till 11-40 p.m. on the night of Sunday, the 14th April, when, the sea being fortunately absolutely calm—the vessel running certainly at over 20 knots, the weather being quite clear and bright starlight ice was reported a quarter of a mile ahead. The engines were at once stopped, the helm was apparently starboarded, and all bulkhead doors were closed from the bridge. But it was too late, the giant vessel ran over a submerged ledge of an irregular-shaped berg and tore out her starboard bilge, holing a large number of compartments. The shock itself was undoubtedly slight and hardly noticeable; it did not disturb the card players in the smoke-room beyond making them look up, when they saw that the ship was passing close to a large iceberg—probably the higher part of the one which had inflicted the death wound.

This fact, strange as it may sound, seems to have been one of the most dire characteristics of the casualty. Had the vessel run head into the berg—as it were butting a wall of ice, she would undoubtedly have sustained terrific injuries—at 20 knots it is calculated that a blow equivalent to 2,000,000 foot tons, or three times the weight of the simultaneous discharge by all the guns of H.M.S. *Orion*, would be struck by a vessel displacing 60,000 tons of water such as the *Titanic*. A hard-on blow would have annihilated her bows—back even perhaps to almost amidships, but the rest of her might have been watertight, and so floated until daylight when help would have been at hand. But the glancing blow did not exhaust her way till every compartment was ripped. Capt. Smith being assured of the serious nature of the damage behaved as one would have expected. All hands were called—passengers included; life belts were served out to all, some taking them reluctantly, as every one of the passengers believed that the vessel was unsinkable and thought the precautions being taken were entirely unnecessary. Some of the passengers even declined to go in the boats thinking they would come back in the morning with colds, and might as well be in their comfortable state-rooms whilst the damage was being temporarily repaired. The card players continued their game, the gymnasts went back to their gymnasium, the old hands turned in again, the band began playing "rag" tunes to divert their hearers from the casualty. But soon came the order "clear away the boats and lower them to level with the B deck." Meanwhile, women and children were mustered on that deck and put into the

Analysing the members of the crew it appears that
4 officers,
39 seamen,
96 stewards, and
71 firemen,

210 in all, were taken on board the *Carpathia*.

The *Carpathia* arrived at New York late on Friday night, 19th April, and the following day an investigation into the circumstances of the tragedy was opened by a committee of the United States Senate.

First of all there is a public outcry about the boat accommodation. It is said that the *Titanic*, which in passengers and crew had room for over 3,000 persons, had only boat space for 1,200 people. The Board of Trade regulations do not insist on provision of boats and life rafts for more than about 990 people for any passenger steamship. The demand now is that every soul on board should have his boat space. If this demand be persisted in it will necessitate a revolution in the principles and methods hitherto adhered to by all four of the great maritime nations of the world. The general principle was initiated by the Life Saving Appliances Committee, which sat some quarter of a century ago, under the presidency of the late Mr. Thos. H. Ismay, of the White Star Line. At that time the *City of Paris* and the *City of New York* of the Inman Line, and the *Majestic* and *Teutonic* of the White Star Company were believed to be the last words in Atlantic steamers. They were all of approximately 10,000 tons gross registered, and the British tables then framed stopped at an upward limit of 10,000 tons. The question of a revision of the tables seems to have been before the advisory committee which deals with shipping subjects referred to it by the Board of Trade. But though considered, no action has yet been taken, it being apparently considered that modern shipbuilders had made their ships so safe that rapid foundering need not be contemplated. Certainly, as the following tables show, our rules never considered it necessary for boat accommodation for all on board to be provided, for the *Paris* and *Teutonic* were the *Titanics* of the later eighties.

		Boats under davits			Extra accommodation in other boats or rafts [illegible]			Or if properly bulkheaded		
	Gross Tonnage	No.	Cubic Contents of [illegible]	Accomm'n for [illegible]	No.	Cubic Contents	Accomm'n for Persons	No.	Cubic Contents [illegible]	Accomm'n for Persons
			ft.			ft.			ft.	
City of Paris	[illegible]	16	5,500	550	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Majestic	[illegible]	14	[illegible]	525	10	[illegible]	394	[illegible]	[illegible]	[illegible]

So that these vessels would carry boat accommodation for say 756 and 722 persons respectively. These figures are subject to certain possible adjustments according to the types of boat used, but they are approximately correct.

JOSEPH BELL, Chief Engineer

H. T. WILDE, Chief Mate.

W. E. FARQUHARSON, Senior 2nd Engineer.

But the passenger certificates provided for the carriage of the following passengers:—

	First class.	Second class.	Third class.	Total.	Boat accom'da'n as above.
City of Paris	[illegible]	[illegible]	[illegible]	1215	[illegible]
Majestic	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

In addition to these numbers there were the crews amounting to several hundred persons. It will therefore be seen that at no time did the rules contemplate the provision of boats for even fifty per cent. of the persons carried.

Many considerations would have to have attention if any substantial addition to the boat accommodation was really enacted. Would there, it may be asked, have been time to have launched more boats if the *Titanic* had had them? And remember many of those she had were not full. It may be that even in this case the policy of bulkheading, instead of adding

boats, was justified. For had the vessel been less scientifically constructed she might have foundered before the boats she had could be got away.

The most immediate lessons of the catastrophe seem to be the need for continuous watchers in the Marconi room, the abolition of life rafts, and collapsibles as substitutes for lifeboat accommodation, and, possibly, an attempt to utilise the orlop deck as a water-tight flat.

It should be added that the same principle as to boat accommodation obtains in France, Germany and the United States as in Britain. In each country the obligations are in the case of ships of a certain size more onerous and in that of others less onerous than our own. If our rules need overhauling so do they all.

The pecuniary loss is terrific. The ship cost £1,750,000. Of this a great part falls on the underwriters. Then there is the liability of the owners to the crew under the Workmen's Compensation Act. That applies to the case of all employés earning less than £250 a year, and may amount to £300 in any individual case. If negligence on the part of those in charge of the ship be established there may be claims by dependents of the lost up to £15 a ton of the ship's registered tonnage. Then there is the loss of passengers' effects and cargo. The *Titanic* is said to have had fifty tons of india-rubber and £9,000 worth of ostrich feathers on board, besides motor cars, Sevres china and other costly articles. One lady had three necklaces insured for £150,000 altogether. The underwriters, of course, hope these were saved. Then there were 3,000 bags of mails, and there were the contents of the wealthy passengers' trunks and dressing cases, which must be worth a huge sum. That is all lost, and lost to some one, though that some one—thanks to the belief that the ship was unsinkable—is probably the owner himself, and not the underwriters.

Modern science kept the ship afloat long enough to get the boats away with their living cargo. Modern science summoned the *Carpathia*, and we have seven hundred lives saved by its wonders. But the disaster has exposed many gaps in our harness against the assaults of the untamable sea, and it will be well if, instead of being satisfied that some lives were saved, in a case where there might well have been an instant foundering and a "missing ship" posted, we, without panic and with due consideration, set about seeing how we may profit by the costly experience through which the people on both sides of the Atlantic have passed.

The United States Senate is now holding an enquiry on the occurrence, and has elicited various strange pieces of evidence: that the Leyland liner *Californian* was within twenty miles of the *Titanic* when she signalled for help and never took the call, her wireless apparatus being out of operation; that another unidentified ship was close enough for her lights to be seen, and that the vessel never took any notice of the rockets sent up. These and other pieces of evidence may be received for what they are worth at present. We may trust to hear the whole truth, as far as the survivors know it, when the special enquiry to be held in London under the presidency of Lord Mersey—formerly Mr. Justice Bigham—investigates the matter. Meanwhile we must possess our souls in patience, and do what we can to perpetuate the memory of the brave dead and to assuage the sufferings of the bereaved.

Obituary.

THOS. ANDREWS, JUN.

"Heroic unto death." This is the epitaph of one who gave up his life for others in the appalling disaster that overtook the ill-fated *Titanic*. The many friends and relatives of Mr. Andrews earnestly hoped that his name might appear in the list of survivors, but eventually a cablegram was received reading

> "Interviewed *Titanic* officers. All unanimous Andrews heroic unto death. Thinking only safety others. Extend heartfelt sympathy all."

A further cable was received from New York as follows:—

> "After accident Andrews ascertained damage, advised passengers put on heavy clothing, prepare leave vessel. Many sceptical about seriousness damage, but impressed by Andrews knowledge, personality, followed his advice, saved their lives. He assisted many women, children to lifeboats. When last seen officers say was throwing deck chairs and other objects to people in water. His chief concern safety of everyone but himself."

Mr. Andrews was the second son of the Right Hon. Thos. Andrews, D.L., of Comber, Co. Down, and a nephew of Lord Pirrie. He was only thirty-nine years of age in February, thus at an early age a brilliant career has been cut short with tragic suddenness. Mr. Andrews served his apprenticeship with Messrs. Harland & Wolff, and his ability and devotion to his work soon marked him out for a position of responsibility in the firm's service. He passed through every department in the yard, rising step by step, till finally in 1907 he was made a managing director. He was closely identified with all the big building and repairing undertakings carried out by the Queen's Island firm during the past fifteen years or so, and was familiar with every detail in the design and construction of the leviathans *Olympic* and *Titanic*.

Mr. Andrews was a man of big-hearted and sympathetic nature, and his kindly disposition endeared him to all with whom he came in contact, both in a business capacity and in the friendly relations of private life. He leaves a widow and one little child—a daughter—to mourn his loss, and to them and all his relatives genuine and deep sympathy is extended. May that large measure of sympathy, and the high tribute paid to Mr. Andrews' memory by the *Titanic's* surviving officers—"Heroic unto death"—help to comfort the bereaved in their sad affliction.

CAPT. SMITH.

The commander of the *Titanic*, Captain Edward J. Smith, R.N.R., was very well known and was one of the most popular masters in the Atlantic service. He was in command of the *Olympic*, and her unfortunate collision in the Solent with the cruiser *Hawke* was the first serious mishap in his long experience. Captain Smith, who was sixty years of age, had been in the service of the White Star Line for thirty-eight years and had commanded a number of the Company's vessels. Born in Staffordshire, he served his apprenticeship to the sea in the ships of Messrs. Gibson & Co., shipowners, of Liverpool. Joining the White Star Line as fourth officer, he received his first command in 1887, and has had charge of its largest ships. During the South African War he thrice carried troops in the *Majestic*, and was decorated by the Government for his services as transport officer. His career has been one of continuous advancement; each development in size and power of White Star vessels saw Captain Smith taking a step forward in the importance and responsibility of his commands. Passengers liked him, his employers trusted him, because they knew him to be a good sailor and careful navigator. He served as a member of the Executive Council of the Mercantile Marine Service Association, held an extra master's certificate and was an honorary commander of the Royal Naval Reserve. Captain Smith leaves a widow and daughter.

NORMAN HARRISON, A.M.I.Mech.E.,
Junior 2nd Engineer.

J. H. HESKETH,
Junior 2nd Engineer.

H. R. DYER,
Senior Assistant 4th Engineer.

JOSEPH BELL.

CHIEF ENGINEER.

Mr. Bell, chief engineer of the *Titanic*, was born at Earlam in Cumberland, and received his education at a school in Carlisle. His apprenticeship was served at the works of Messrs. Robert Stephenson & Co., Newcastle-on-Tyne. He entered the mercantile marine about 1883, and served in vessels owned by Messrs. Lamport & Holt, Ltd. In 1885, he joined the White Star Line, and it is known that he saw service in the following vessels: *Majestic*, *Britannic*, *Germanic*, *Ionic*, *Bovic*, *Corinthic*, *Suevic*, *Athenic*, *Celtic*, *Cufic*, *Baltic*, *Oceanic*, *Adriatic*, *Laurentic*, and *Olympic*, from which vessel he was transferred to the *Titanic*. He had been on both the New York and New Zealand services, and at thirty years of age was Chief in the *Cufic*. Mr. Bell, who was fifty-one years of age, leaves a widow and four children, two boys and two girls; the eldest boy, 19½ years, has recently started as an apprentice in marine engineering at Messrs. Harland & Wolff's Ltd., and accompanied his father in the *Titanic* from Belfast to Southampton. Mr. Bell was a member of the Institute of Marine Engineers, which Institute he joined in 1891, and was also a member of the Royal Naval Reserve. He was a most capable officer and his loss will be keenly felt among a large circle of relatives and friends.

LIEUT. H. T. WILDE.

CHIEF MATE.

The appalling disaster to the *Titanic* has taken away, in the person of Lieut. H. T. Wilde, R.N.R., one of the most promising officers serving with the White Star Line. Lieut.

ARTHUR WARE,
Junior Assistant 4th Engineer

WILLIAM DUNN MACKIE,
Junior 5th Engineer.

WILLIAM MOYES,
Senior 6th Engineer

Wilde, who was chief officer of the *Titanic*, commenced his sea career in the sailing ships of Messrs. James Chambers and Co., of Liverpool. On the completion of his apprenticeship he secured his second mate's certificate, severed his connection with sailing craft and entered steam. He soon obtained his master's certificate and joined the White Star Company as a junior officer. Mr. Wilde held an extra master's certificate and had attained the rank of Lieutenant in the Royal Naval Reserve. He was chief officer of the *Olympic* at the time of the collision with the cruiser *Hawke*. He possessed great organizing capacity, and this qualification stood him in good stead as chief officer of these huge liners. He had been in the service of the White Star Line for about fifteen years, and it was understood that he was shortly to be given the command of one of the Company's vessels. He was an officer of merit and deservedly popular, and those who knew him will be satisfied that at the time of trial and danger, he did his duty and died at his post in the spirit of the true British sailor. He leaves four young children, his wife having died several months ago. Lieut. Wilde was thirty-eight years of age.

W. E. FARQUHARSON,

SENIOR SECOND ENGINEER.

Born in 1873, the deceased engineer was the son of the late G. W. Farquharson, who was for thirty years with Messrs. T. B. Royden & Co., shipowners, in Liverpool. Mr. Farquharson served his apprenticeship with Messrs. Higginsons of that town, and afterwards joined the Anglo-American Tool Company. He first went to sea when twenty-two years of age and served in vessels owned by Messrs. Wm. Johnston & Co., Ltd., of Liverpool and London, and later John Markwood, Liverpool. He first joined the White Star Line in 1900, serving as assistant second engineer in the *Teutonic*. He was later transferred to the *Suevic*, and remained on that vessel for three or four years. His next appointment was to the liner *Majestic*, as junior second engineer, and he afterwards became senior second engineer on the *Teutonic* and later held the same rank on the *Oceanic*. He spent about two months in Belfast watching the building of the *Titanic*, to which vessel he was promoted as senior second engineer. He resided at Southampton and leaves a widow and three children to mourn his loss.

NORMAN HARRISON, A.M.I.Mech.E.,

JUNIOR SECOND ENGINEER.

Mr. Harrison was a native of Liverpool and born in the year 1873. His apprenticeship was served with the firm of Messrs. Higginson & Co., of Liverpool. He first went to sea in a vessel belonging to the Elder Line, Ltd., and he remained with this Company until he passed as Chief Engineer at the age of twenty-three. The White Star Line then claimed his services as third engineer of the *Delphic*, He next served in the following vessels :—*Athenic*, *Corinthic* and *Adriatic*, on which latter vessel he was senior second engineer. He was finally selected for duty in the *Titanic* as junior second. He was recently admitted an Associate Member of the Institution of Mechanical Engineers. Mr. Harrison leaves a widow, but no children. Both his parents are alive.

J. H. HESKETH.

JUNIOR SECOND ENGINEER.

Mr. J. H. Hesketh entered the service of the White Star Company as engineer apprentice at fourteen years of age, and began his sea-going career as sixth engineer on the *Afric*. He also saw service on the *Cedric*, *Medic*, *Persic* and *Cuefic*, and was employed in connection with the salvage of the *Suevic*. While on board the *Majestic* he had charge of the refrigerating machinery and was instrumental in securing a greatly improved quality of cargoes. He was selected for service on the *Laurentic*, and later on the *Olympic* and made some useful suggestions for the machinery spaces in the *Titanic*. He was acting as one of the three second engineers on board the *Titanic*, his *confrères* being Messrs. Farquharson and Harrison. Mr. Hesketh was the youngest acting second engineer in the White Star Line and was a fine steady level-headed man. His last words as he left his home to join his ship were, "Don't fear for me, this ship is unsinkable." He was thirty three years of age unmarried and had his residence, when at home, with his father and mother at Walton, Liverpool.

ARTHUR WARD,

JUNIOR ASSISTANT FOURTH ENGINEER.

Age twenty four years, served his apprenticeship with Messrs. Mitchell Bros., of Romsey, Hants., and Messrs. John I. Thornycroft & Co., Ltd., of Southampton. In 1907 he went to sea in the Siamese gunboat *Suna Monthon*, built by Messrs. Thornycroft, and later entered the service of the White Star Company in 1908. He saw service in the *Teutonic*, *Adriatic* and *Olympic*, from which vessel he was transferred to the *Titanic*, on which ill-fated vessel he met his death on the threshold of his career.

W. D. MACKIE.

JUNIOR FIFTH ENGINEER.

Mr. William Dixon Mackie, who was born in Glasgow, was at an early age brought to West Ham, Essex, where he spent his school days. He served his apprenticeship at the Glengall Ironworks, Millwall, and since the end of his apprenticeship days had been mostly away at sea. He was for a few years in the P. & O. service, leaving that Company to join the White Star Line. Under this Company he served in the *Majestic* and the *Olympic*, and was on board the latter vessel at the time of her collision with the cruiser *Hawke* in the Solent. He was later transferred to the ill-fated *Titanic*. Mr. Mackie was thirty-two years of age and of a bright and cheerful disposition. His wife predeceased him last year and since her death he had taken up his residence when ashore with relatives at Forest Gate, to which district he had moved from Southampton.

WILLIAM YOUNG MOYES.

SENIOR SIXTH ENGINEER.

Mr. William Young Moyes received his education at the Stirling High School and served his apprenticeship with Messrs. David Rowan & Co., of Glasgow. He entered the White Star service and served on the *Oceanic* about three months and was then transferred to the *Titanic*, in which vessel he was senior sixth engineer. He was twenty-three years of age and was the son of Mr. Moyes, headmaster of the Primary High School, Stirling.

ANTWERP.—The great scheme of dock extension which has been projected on the banks of the river Scheldt will, when carried into effect, prove of great benefit to the shipping and trade of Antwerp. The regular lines of steamers using the port have, as far as there is accommodation, berths at the river quay, and in these cases there is no necessity to pass into the docks, unless for dry docking, and the cost of shifting with consequent loss of time and risk of damage is thus minimized. The wet docks which have been built during recent years have been necessary to meet the growth of the port ; the sheds were not erected and fitted so quickly as they might have been to accommodate the steamers admitted to the new sections, nor have roads and conveyances been introduced to suit the convenience of the ships' companies. Those whose lot it has been to find their way from the railway station to a far away berth in Siberia Dock know the difficulties of the way, and it is time that the authorities should arrange to lay tram car lines down to the extension on the river side of the docks or a light railway in order to provide a means of transit to the furthest down dock, which is a considerable distance from Antwerp. The new scheme not only embraces the extension of wet docks and dry docks with a new entrance below Fort la Perle, which is on the opposite bank of the river, and nearly as far down as Fort Liefkenshoek, but alterations to the bend of the river to lessen the tendency of silting up. Quay accommodation will be provided on the bank of the river adjacent to the entrances to the wet docks, and thence to the dry docks appears, according to the projected plan, an easy water way.

Group of Engineer Officers taken on board the White Star Liner "Oceanic."

(Mr. Ferguson, Chief Engineer.

The following Engineers in the group lost their lives in the *Titanic*.

W. F. Ferguson, in front row, third from left, Senior 2nd Engineer on the *Titanic* . . . age [illegible]
G. F. Hosking, in front row, second from left, Senior 3rd Engineer . . . . . " 3[illegible]
F. C. Dodge, in second row, fourth from right, Junior 3rd Engineer . . . . . " 3[illegible]
H. G. H[illegible], back row, in centre, Junior Assistant 2nd Engineer . . . . . " 3[illegible]

THE FLEETS OF THE MAIL LINES.

(From our Own Correspondent.)

The Opening of the Panama Canal.

THE opening of the Panama Canal is now so near that in every direction one hears of new services and extensions of existing ones which will be occasioned by its completion.

The Pacific Steam Navigation Company,

for example, which has been trading on and to the West coast of South America since the early forties, has announced its intention to extend its fortnightly service of mail steam ships, which now run through the Straits of Magellan to Callao, as far up the Coast as Panama. This means an addition of 1,340 miles to their itinerary in either direction. Then the

Pacific Mail Company,

which is, of course, an American organization, has announced its desire to open a new service of passenger and cargo vessels from New York through the new canal to San Francisco and the Far East. But such an important departure will, of course, involve the construction of new tonnage, and here the offensive activity of legislators—which is nowhere more marked than it is in the United States—seems likely to prove a hindrance. With a view to discouraging what it calls "combinations," Congress is now considering a bill which shall prohibit the use of the Panama Canal by ships owned in whole or in part by Railway Companies. If this bill is passed by the legislature there is an end of the project. For the Southern Pacific Railroad, as is well known, owns the controlling interest in the Pacific Mail Company, and thus the ships, when completed, would be debarred from running in the trade for which they are designed. Nor does it seem possible for any modus to be found by which the effects of such an enactment as has been indicated could be avoided, for the money to build the ships could not be obtained at all in such a state of the law as is here contemplated. Banks would naturally be the institutions to whom the shipowners would turn for assistance if the aid of railways was shut out. But there are few, if any, banks in the United States which are not interested financially in railroad undertakings, and so their aid also would be prohibited.

The short-sighted policy of those who are pressing forward the bill is apparent when one regards the details of the proposed ships. They were to be of a length of 685 ft. with 75 ft. beam and 30 ft. depth of hold. Seventeen knots speed was to be obtained, oil fuel being relied on for firing the boilers, and accommodation for 800 passengers—300 in saloon, 200 in the second cabin and 300 in the third-class—would be provided, whilst the cargo capacity would be 17,000 tons, the displacement being some 38,000 tons each. The voyage between New York and San Francisco was to have been accomplished in seventeen days, and the vessels were thence to proceed to Yokohama and Hong Kong. The four vessels would have totalled in cost about two millions sterling, and would have given most useful work to American yards. The project had got beyond the stage of mere discussion, for tenders for their construction had actually been obtained from both Messrs. Cramp's, of Philadelphia, and the Shipbuilding Company of Newport News. At present, however, as I have indicated, the whole project is held up. It is worthy of note that whilst steamships in which United States Railroads are interested, and which fly the Stars and Stripes, are to be debarred from using the canal, no such interference is to be—or probably under the terms of international agreements can be—allowed by Congress in the case of vessels under other flags, even though railroads abroad may have proprietary interests in them.

Though she is certainly not, and never has been, a mail steamship, one may perhaps be pardoned for making a brief reference to the

Old Convict Ship, "Success,"

which, some years ago, was on view off the Thames Embankment at Blackfriars. Since that date she has been towed round the coasts of Britain, her last port of call being Glasgow Dock. Whilst there a sale has been effected, and she is to become the property of certain Americans, who propose to use her for exhibition purposes. She was at the time of the sale, on view at Douglas, Isle of Man, and her visit to Glasgow Dock was for the purpose of having her exhibition jury masts taken out and replaced by practical spars. She was now barquantine rigged and subjected to a general overhaul for the purpose of enabling her to obtain a Board of Trade certificate that she is fit for an Atlantic voyage. Her new owner is even having a wireless installation put aboard, and the operator's office is one of the old convict cells. Her departure removes from our shores one of the oldest craft afloat, for she dates, I believe, from the end of the eighteenth century. But, being built of teak, she is no doubt likely to last many years yet, if she can weather the storms of the Atlantic.

The early part of 1912

has been unexampled in the matter of bad weather and consequent disaster. But perhaps one of the most remarkable instances of its severe weather has been seen in the experience of the Cunard liner *Mauretania* on the 8th April. The *Mauretania* fortunately sustained no injury whatever, but the occasion is none the less noteworthy. Her voyage across the Atlantic had been rapid and uneventful, her average speed for the voyage exceeding 25 knots, whilst on the last day she had made over 26 knots. In the morning she made the usual call at Fishguard, landing there her mails and those passengers who were desirous of using the facilities of the Welsh port. When the liner arrived at Liverpool, however, the storm had attained such unusual violence that not only was it out of question for her to go alongside the landing stage, but it was even deemed unsafe to disembark the passengers by tender. Nor did her Commander care to take her to the Cunard moorings in the Sloyne, where great seas were running, and accordingly he passed out of the river again, and went beyond the bar, where, with plenty of sea room, he could await the abatement of the gale. The passengers were accordingly not landed till the morning of the 9th April.

The Orient Line

have just disposed of their single-screw steamship *Ormuz*, of 6,465 tons gross register, built in 1886 at Glasgow, by the Fairfield Shipbuilding Company. The purchasers are foreigners, and I think this sale removes the last single-screw vessel from this fleet.

A more terrible catastrophe

has diverted public attention from the loss of the *Oceana*, but in spite of bad weather the work of extracting the precious metals from her holds is being pursued whenever opportunity offers, and with exceedingly satisfactory results.

The Hamburg Sea Court has now pronounced its judgment, after inquiry into the circumstances attending the collision which caused the *Oceana's* loss. The Court has expressed itself satisfied that the *Pisagua* was in no way to blame and that her regulation lights were burning properly. The opinion is expressed that—the obligation being on the steamer to give way to the sailing vessel—the *Oceana* held on her course too long and then manœuvred to cross the sailor's bows, instead of being satisfied to pass under the stern.

On the 1st April, 1912, the Union Castle Company changed hands, and the famous firm of Messrs. Donald Currie & Co. ceased to exist. On the appointed day the Royal Mail Company handed over their cheque for the sum of £5,100,000, drawn on the Bank of England to Messrs. Donald Currie & Co., taking in exchange a certificate for practically the whole of the shares in the Union Castle Company, and also, no doubt, an undertaking from the firm that it will no longer engage in the South African trade. For the consideration of this undertaking, Messrs. Donald Currie & Co. retain some £700,000 out of the proceeds of the cheque, and distributed at once the balance of the money to the shareholders of the Union Castle Line in the proportions to which they are entitled. The Council of the Union Castle Line at the same time arranged to retire in favour of the new Board, which includes Sir Owen Philipps, Lord Pirrie and two directors of the Royal Mail Company—the Union Castle Line being henceforth an appanage to the older concern. So ends an eventful episode in the history of steam navigation and of South Africa.

Group of Engineer Officers taken on board the White Star Liner "Adriatic."

(MR. BOYLE, Chief Engineer.)

The following Engineers in the group lost their lives on the *Titanic*:

MR. NORMAN HARRISON, the third officer from right in the second row. He was Junior 2nd Engineer on that vessel.

MR. ARTHUR WARD, the fourth from the left in the top row.

ARGENTINE BATTLESHIPS "MORENO" AND "RIVIDAVIA."

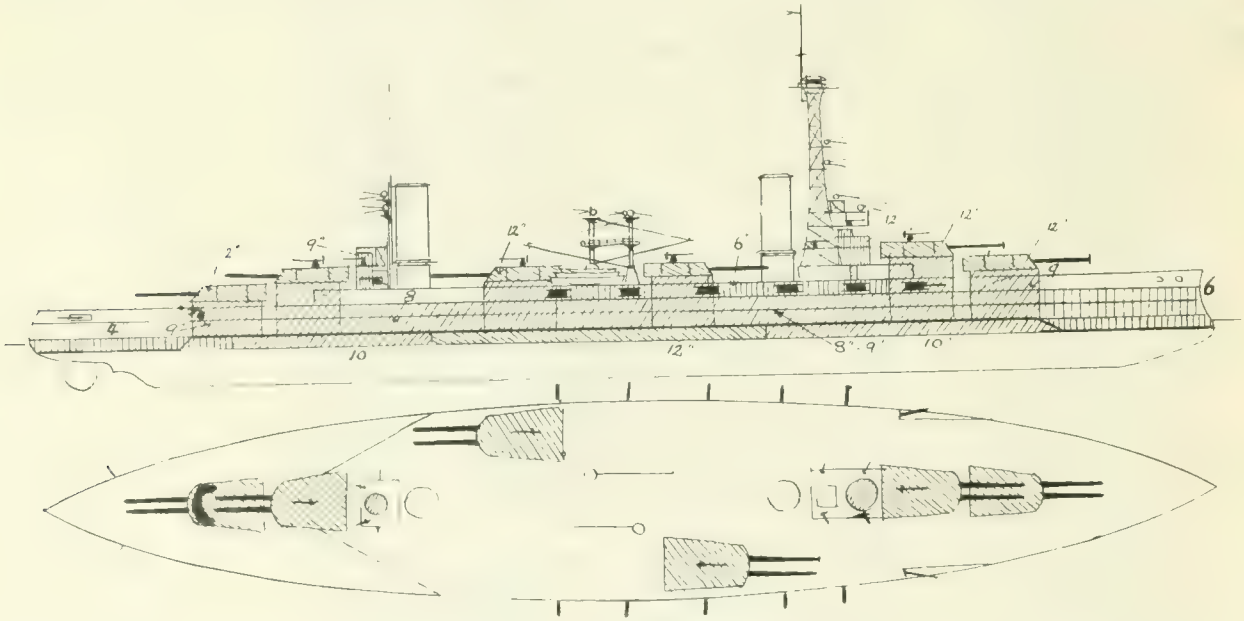
BUILT as a reply to the Brazilian Dreadnoughts *Minas Geraes* and *Saõ Paulo*, the two battleships now completing at the yards of the New York Shipbuilding Co. (*Moreno*) and Fore River Co. (*Rividavia*) are amongst the most powerful war vessels afloat. Their Brazilian "opposite numbers" carry an armament of twelve 12-in. and twenty-two 4·7-in. guns, upon a displacement of 19,250 tons, the guns being so disposed that eight 12 in. can fire axially ahead or astern and ten on either beam. With 24,500 H.P. they were assigned for 21 knots, the actual highest speed attained on trial being 21·6 knots.

The contracts for the Argentine ships resulted in one of the keenest competitions ever experienced in the shipbuilding trade. Twenty of the world's biggest firms were asked to submit designs and tenders, and these were twice revised. Professor Biles writing to the *Times* commented upon this procedure as follows:—

"No shipbuilder in this country can separate the knowledge which he gains in the building of ships for the British Admiralty from the rest of his knowledge. We may assume that the British battleships embody good ideas and good practice—in all probability the very best. These cannot fail, in a greater or less degree, to become part of the designs which the British shipbuilder first submits to the Argentine Government. In the second enquiry it may be presumed that everything that was good in the first proposals had been seized upon by the Argentine authorities and asked for in the new design. This second request went not only to British builders, but to all the builders of the world, and in this way it is exceedingly probable that a serious leakage of ideas and practice of our ships was disseminated throughout the world by the Argentine Government. The British builders in replying to this second enquiry would in all probability point out that some of the things were impracticable, or had been tried and found undesirable in the British navy, and the Argentine authorities would be informed on additional matters which had come under the builders' knowledge by their acquaintance with British practice. The third enquiry that was issued showed to all the builders of the world what had been eliminated or modified in the second enquiry; and so the process of leakage went merrily on and with it the education of foreign builders and the Argentine Government."

In any case, the final design agreed upon was at the time the contract was signed quite the most powerful extant, and the American firms certainly deserved the congratulations they received, the price of the vessels being £2,190,000 each, including guns and ammunition but not torpedoes.

Upon a displacement of 27,440 tons, the *Moreno* carries twelve 12-in. guns in six pairs. The fore and aft pairs of guns being super-firing, and the amidship pairs *en echelon*. The height of the guns above water are: No. 1, 31 ft. 8 in.; No. 2, 39 ft. 8 in.; Nos. 3 and 4, 31 ft. 8 in.; No. 5, 31 ft. 8 in. and No. 6, 22 ft. 5 in. The guns are 50 cals long, fire an 867 lb. projectile with an initial velocity of 3000 feet per second, a muzzle energy of 16,890 tons, and can pierce 14 in. armour at 6000 metres. Ammunition for 120 rounds per gun is allowed for.



Plan of the *Moreno*.

A secondary battery of twelve 6-in. is carried 19ft. 6in. above the water line along the upper deck, the gun ports being recessed to allow for wide angles of fire. These pieces are 50 ft. long and have a projectile of 105 lbs., their rapidity of fire being 6-8 rounds per minute. In addition twelve 4-in. are distributed on the superstructure and turret-tops and two 21-in. torpedo tubes are fitted.

Protection is afforded to the water line by a belt 12 in. amidships, tapering from a 10-in. strake to 6-in. at the bow beyond the fore turret and 4-in. at the stern. Above this is the 9-8 in. lower and main deck side armour, tapering to 6 in. at the bows, and the 6-in. battery wall. The main belt is 200 ft. long, and is 4 ft. 9 in. above and 3 ft. 4 in. below the water-line.

All six turrets have 12-in. sides, 7-in. roofs and

The Argentine Battleship *Moreno*

11-in. backs, the bases being-9 in. The machinery and magazines are some 13 ft. distant from the hull side, and divisional compartments form a triple protective shell against under-water attack. Armour 1½ in. thick covers the funnel bases to 15 ft. above the upper deck, and there are two protective decks, the upper being 1½-in. and the lower 3-in. thickness.

Driven by turbines of 39,500 H.P. the designed speed is 22·5 knots, steam being generated by Babcock and Wilcox boilers. The coal supply is immense, being no less than 4000 tons, with 660 tons of oil in addition, giving her a radius of 10,200 miles at 11 knots and 3,600 miles at 22·5 knots. Bullivant net defence is carried below the 6-in. battery.

The following table gives her comparison with contemporary ships:—

basket mast is still under discussion; American naval opinion has condemned it as too "whippy" for accurate gun-control, but as they are still being fitted to U.S. ships, its advantages may be thought to counterbalance this rough sea defect. The searchlights are on platforms on the masts, well away from the guns.

There are two conning towers, that forward being 12 in. and the after one 9 in. thick. In addition there are subsidary armoured towers on the deck level for range-control apparatus.

The *Moreno* and *Rividavia* were laid down early in 1910 and are to be completed this year. Up to the time of writing neither ship has run her trials, and it is quite possible that there will be some delay in their delivery.

COMPARATIVE TABLE.

Nation.	Name.	Displ	Designated H.P.	Speed.	Armament.	Torpedo Tubes.	Armour in inches A	B	C	D	E	Launched.	Coal. (tons).	Big gun broadside (lbs).
England..	*Orion*	22,680	27,000	21	10 13 5" 16 4"	3	12	2¾	10	8-12	0	1910	900/3000	12,500
France ..	*Jean Bart*	23,026	29,000	20	12 12" 22 5"	4	10½	3	?	12-9	7"	1911	900/2700	9,700
Germany .	*Kaiser*	24,500	27,000	20	10 12 2" 14 6 7" 16 3·4"	10	11¾	?	?	?	6½"	1911	? /3600	9,810
U.S.A. ..	*Wyoming*	26,000	28,000	20·5	12 12" 21 5"	2	11	3	10-8	12-8	6½"	1911	1670/2500	10,200
Russia ..	*Sevastopol*	23,000	42,000	23	12 12" 16 4 7"	4	11	3	8	12-10	5"	1911	? /3000	8,640
Italy	*Danti Alighieri*	18,940	29,000	23	12 12" 20 4 7" 16 3"	3	10	2½	8	12	4'	1910	1000/2500	10,200
Austria ..	*Veribus Unitis*	20,000	25,000	20	12 12" 12 5 9" 18 2 7"	4	11	2½	8	12	6"	1911	900/2000	11,904
Brazil ..	*Sao Paulo*	19,250	24,500	21	12 12" 22 4·7	4	9	2½	9	9	9"	1909	800/2350	8,500
Argentine.	*Moreno*	27,940	39 500	22·5	12 12" 12 6" 12 4"	4	12	3	9-8	12	6"	1911	? /4000	10,200

A—Belt. B.—Protective Deck. C—Side above Belt. D—Big Guns. E—Secondary Guns.

In design the *Moreno* is an enlarged *Neptune* with an extra turret forward, the *en echelon* guns having a fairly wide arc of training across deck. Comparison between her and the U.S. *Wyoming* shows the relative merits of this method of gun disposition and the "all-centre-line," as the armaments are almost identical. The pros and cons of both arrangements have been discussed at length in these columns as previous ships have been dealt with, and we do not propose entering into a further digression on the subject, beyond the fact that the "all-centre line" idea has been taken up by practically every power now with the exception of Germany.

Superstructure has been reduced to a minimum in these ships and the flying boat-deck which is such a conspicuous feature of the *Neptune* class is dispensed with by stowing these impedimenta on deck between the turrets. Apropos of the rig shown, this is that finally decided upon. Originally the ship was to have had big basket masts fore and aft, then a single one amidships, then one forward with a wireless rig slung between it and a top-mast fitted to the aft of the two derrick masts, and finally the one shown. The value of the

NAVAL MATTERS—PAST AND PROSPECTIVE.

(*From our Own Correspondent*).

Portsmouth Dockyard.

THE First Lord of the Admiralty paid us a visit on April 4th, and having been to the submarine depot at Fort Blockhouse went to the South Lock, where he saw submarine *A* 3. Subsequently he proceeded on board the Admiralty yacht *Enchantress*, which left for Portland. Mr. Churchill spent Easter on board the yacht in Portland Roads, where there was a large assemblage of ships of the Home Fleet, and on Easter Monday the *Enchantress* went on to Devonport. The yacht returned here on Tuesday and Mr. and Mrs. Churchill left for London the next day. On April 15th we had two other distinguished visitors, Mr. Lloyd George, the Chancellor of the Exchequer, and Sir Rufus Isaacs, the Attorney-General, who both went the round of the yard. The battleship *King George* is being fitted with tanks to counteract rolling, and the *Iron Duke* is making headway rapidly. The battleship *Dreadnought* has been taken in hand for an extensive refit. Her ten 12-inch guns are to be fitted out for examination and the propelling machinery is to be opened up. The battleship *Hindustan*,

having completed her refit, left on April 9th for Berehaven to calibrate before rejoining the Home Fleet. The torpedo gunboat *Bittern*, on duty with Section 2 Submarine Flotilla at this port, is to be relieved by the *Adamant* which is completing at the works of Messrs. Cammell, Laird & Co. The *Adamant* is a new type of vessel and is officially described as a "tender to a submarine depot ship." The destroyers *Hornet* built at the works of Messrs. J. Brown & Co., Clydebank, and *Druid*, built by Messrs. Denny Brothers, Dumbarton, have arrived at Portsmouth and have been commissioned for service in the Seventh Flotilla. His Majesty's yacht *Alberta* has been paid off and handed over to the dockyard authorities to be broken up. By the King's directions certain portions of the vessel and her fittings are to be preserved, and of these the figurehead and stern ornaments are by His Majesty's command to be placed in the Dockyard Museum. The cruiser *Powerful* has been dismantled and towed to the Motherbank, off Ryde. The cruiser *Sappho*, which has been flying the flag of Vice-Admiral Sir Henry Jackson, commanding the Royal Naval War College, has been recommissioned for service with the Home Fleet in place of the despatch vessel *Surprise*, which will probably be placed on the sale list. On April 10th seven obsolete destroyers were sold by auction, realizing the following prices:—*Spitfire*, £1,040; *Rocket*, £1,350; *Lynx*, £1,070; *Banshee*, £1,780; *Hunter*, £1,370; *Haughty*, £1,450, and *Daring*, £1,000. The old screw steamer *Fanny* fetched £930. The destroyers have to be broken up in the United Kingdom. Two important changes are to take place at Portsmouth, Admiral Sir Hedworth Meux having been selected to succeed Admiral Sir Arthur Moore as Commander-in-Chief, but the change will not probably take place until the end of July. Admiral Meux is better known by his original surname of Lambton. Rear-Admiral Heath is to succeed Rear-Admiral Tate as admiral-superintendent of the dockyard on May 10th. Engineer-Captain Westaway, who is on the staff of the admiral commanding the Home Fleet at this port, has been awarded the good service pension of £150 a year in the vacancy caused by the promotion of Engineer-Captain Pamphlett to engineer-rear-admiral.

Devonport Dockyard.

The battleship *Temeraire*, of the First Division of the Home Fleet, arrived from Portland on April 2nd to undergo her annual refit. With her arrival there were seven vessels of the "Dreadnought" type here—the battleships *Orion*, *Collingwood*, *Vanguard*, *Monarch* and *Temeraire*, and the battle-cruisers *Lion* and *Indefatigable*. There are also in course of construction the battleships *Centurion* and *Marlborough*. Such an assembly of modern warships has, it is safe to say, never been seen before in any port in the world. The *Orion*, flagship of Rear-Admiral King Hall, left on April 5th for Portland to rejoin the Second Division of the Home Fleet on the completion of alterations to her bilge keels. During the time the vessel was in dock the compass platform was extended so as to enable the instruments to be moved several feet forward in order to place them beyond the influence of steel work which was found to affect the magnetism. It is understood that the *Orion* will become the senior flagship in the reorganized fleet. The *Collingwood* left for Berehaven on April 6th to calibrate after refit and then rejoined the Home Fleet. The *Vanguard* is also out of hand and has left. The battleship *Monarch* arrived from the Tyne on April 1st to be docked for various adjustments. The narrow and tapering bilge keels are being removed to enable broad keels to be substituted similar to those fitted to the *Orion*. The extended compass platform and wing bridges are also being added. The *Monarch* was commissioned by Captain Napier on April 6th, and when the alterations are completed she is to join the Second Division of the Home Fleet. We had a visit on April 8th from the First Lord, who arrived from Portland in the Admiralty yacht *Enchantress*. Mr. Churchill made a tour of the yard, among the ships visited being the battle-cruiser *Lion*, which is undergoing extensive alterations to her superstructure in consequence of the heat generated in her funnel during the official steam trials. He also visited the battleship *Centurion*, which was launched and named by Mrs. Churchill in November; the battle-cruiser *Indefatigable*, which is undergoing her first annual refit; the battleship *Cornwallis*, which came home from the Mediterranean to give leave; and the cruiser *Cumberland*, which arrived a few days previously on the conclusion of her cruise with naval cadets. The First Lord left for Portsmouth next morning and shortly afterwards there arrived the recently appointed Civil Lord, Sir Francis Hopwood, who in the course of his tour of the establishment paid special attention to the storehouses and the Royal William Victualling Yard. Sir Francis has the supervision of the work of the various departments of the Service connected with contracts and purchasing. On April 15th Rear-Admiral Briggs, the Controller of the Navy, paid us a visit, during the course of which he went on board the *Centurion*, *Marlborough* and *Lion*.

Chatham Dockyard.

As anticipated several hundred men were discharged at the end of March, the close of the financial year, and another batch left three weeks later. The total number discharged, however, does not represent anything like the number entered from time to time during the year. Roughly, about a thousand hands were engaged at various periods owing to the large amount of work which had to be done. The prospects of work for the current year seem to be considerably brightened, it having been reported that the Admiralty have decided to allocate the *Nottingham*, one of the Town class of protected cruisers, to this yard, instead of having the vessel built by contract. As we are also to build one of the light armoured cruisers, there will probably be two ships building at the same time—a thing which has not happened here for many years. The Association of Men of Kent and Kentish Men, encouraged by the fact that our last vessel was named the *Chatham*, have petitioned the First Lord of the Admiralty to give the name of *Rochester* to the new cruiser which is shortly to be laid down at this yard. The cruiser *Antrim* has completed her refit and has resumed duty with the Nore Division of the Home Fleet. The battleships *King Edward VII.* and *Commonwealth*, and the cruiser *Blonde* have arrived for their annual refits and the repair ship *Cyclops* has come in for overhaul. The cruiser *Yarmouth* has arrived on delivery from the London and Glasgow Shipbuilding Company, and has been commissioned for service in the Mediterranean, leaving for her station about April 25th, and calling at Yarmouth to receive a silver bowl from the Town Council. The surveying vessel *Hearty* has been recommissioned for service in the North Sea. The Hydrographic Department at the Admiralty has drawn up a comprehensive programme for the season, and the *Hearty* will for the first time have the assistance of a surveying trawler, the *Esther*. The torpedo gunboat *Sharpshooter*, on duty with Section 3 Submarine Flotilla at the Nore, is to be relieved by the *Helle*. The crew of the *Sharpshooter* is to join the *Alecto*, tender to a submarine depot ship, which is being completed at Messrs. Cammell, Laird & Co.'s. The *Alecto* is to be attached to Section 7 Submarine Flotilla at Dundee. The cruiser *Scylla*, which was built twenty years ago at the works of Messrs. Samuda Brothers, Poplar, and was last employed on the North America and West Indies Station, is to be transferred to the "Material Reserve," when she will be placed in charge of civilian caretakers instead of naval ratings. The destroyer *Leader*, which was built at Cowes by Messrs. J. S. White & Co. in 1894, has been paid off from the Nore Destroyer Division and placed on the sale list in readiness for the dockyard sale on May 14th.

Sheerness Dockyard.

On April 3rd the destroyer *Tigress*, which had just been delivered from the works of Messrs. Hawthorn Leslie & Co., of Hebburn-on-Tyne, came in for repair, having been damaged by collision with the *Spey*, the diving instructional tender at this port. When the accident occurred the destroyer was steaming to her moorings and the *Spey* was taking up her berth on the Lapwell. The latter vessel escaped without damage, but the destroyer had two holes in her side. She was placed in dock and an examination showed that the larger hole, which began just above the water-line, abaft the electrical store, extended to a depth of 4 ft., the breach being sufficiently wide to enable a man to pass through. There was a smaller hole about six inches by nine inches near the keel. It was found necessary to remove and replace four steel plates. The repairs were taken in hand immediately and completed in a fortnight, when the vessel proceeded to Portsmouth to be commissioned for service in the Seventh Destroyer Flotilla. On April 17th the torpedo gunboat *Leda*

came in for repairs, her main top-mast having been carried away and her wireless installation dismantled during a gale in the North Sea. The torpedo-gunboat *Jason*, which has had her boilers retubed, is out of hand, and has been commissioned for service in the Nore Division of the Home Fleet. The minelayers *Intrepid* and *Iphigenia* of the Nore Division, left on April 9th for Plymouth, where the minelayers of the Portsmouth and Plymouth Divisions of the Home Fleet also assembled for a cruise to the coast of Ireland for mine laying exercises, using Berehaven as their base. The minelayer *Latona* left here on the 10th to take part in the cruise, which commenced next day and is to last until June 17th. The salvage operations with coaling lighter *C* 120, which recently foundered with 300 tons of coal on board, proved successful, and the vessel was raised on April 13th with the aid of Yard Craft 94 and Yard Craft 79. Slung between these two vessels the lighter was towed to Chatham. The destroyer *Zephyr*, which has been refitted, has relieved the *Firedrake* as tender to the Chatham Gunnery School. On April 12th Submarines C 2, C 5 and C 6, of Section 3 Flotilla arrived from Harwich for refit. Commander Lacy has vacated his post as Commander of the Yard and Deputy King's Harbour-master and has been succeeded by Commander Penfold. Commander Lacy proceeded to Ireland to take up duty as King's Harbour-master at Queenstown and Deputy Superintendent of Haulbowline Dockyard. A sad accident occurred at the Royal Aero Club's flying ground, Eastchurch, recently, a seaman having been struck on the head by the propeller of a biplane, just as the machine was about to ascend. He was brought to the naval sick quarters here and subsequently died.

Pembroke Dockyard.

The amount allowed for labour on our new vessels during the new financial year is, according to the Navy Estimates, only £96,750, whereas the amount spent during last year was £114,400, and in 1906-7 it was £122,578. During the last six years there has been a gradual decrease, a drop of over £25,000 having taken place during that period. It is not as if fewer men were employed, as that is not the case. During 1906-7 the number of men was 1,985, whereas last year there were 2,140. We shall, of course, have some repair work in the shape of refits of destroyers, as we had last year, which will find employment for a good many men. The report that the Admiralty have decided not to place the order for the cruisers *Nottingham* and *Lowestoft* with the Thames Ironworks Company, but to have one built at this yard and the other at Chatham, has been received here with incredulity. The drawings of a new vessel to be built here came to hand a short time ago, but no particulars have transpired regarding the ship except that she is to be the same length as the vessels of the *Bristol* and *Dartmouth* classes. The refusal of the Admiralty to place the orders for the cruisers with the Thames Company has been discussed at length in the columns of a London newspaper, in the course of which many remarks have been made detrimental to Pembroke. This yard claims a record for cheap construction, and such unfair criticisms as those which appeared in the journal in question are resented locally. The launch of the cruiser *Fearless* will, it is now understood, take place about the middle of May, instead of the end of the month, as previously stated. Work on the cruiser *Amphion* is progressing and the refits of the destroyers *Rother* and *Wolf* are being expedited.

CONSOLIDATED DIESEL ENGINE CO.—This Company, which has taken over the Diesel Engine Company, London, and Messrs. Usines Carel Frères (Sté. Anon.), Ghent, will open new works at Ipswich. Over 1,000 men will be employed.

A BIBLIOGRAPHY of all books in the English language on Engineering and Metallurgy, published during the five years 1907-11, is announced for publication by Messrs. Grafton and Co., of 69, Gt. Russell Street, Bloomsbury, W.C. The work has been compiled by Mr. R. A. Peddie, the librarian of the Technical Library of the St. Bride Foundation, and is arranged in alphabetical order of subjects. It will be as useful in America as in England, as both English and American publishers and prices are given. The book will be issued at 7/6 net ($2).

INTERNAL COMBUSTION MARINE MOTORS.

Continued from page 302

WHEN a coil is working properly there should be a good "buz" made by the hammer. The higher the note produced the better. The setting of the coil is done by the set screw, screwing it up and down until a good "buz" is produced.

The sparking plug, shown in Fig. 10, is screwed into the top of the cylinder with the sparking points projecting into the compression space. The wire from the H.T. magneto or terminal marked S.P. on the coil is fixed by the milled nut, and in electrical contact with the central electrode. The porcelain insulates this from the frame. The bent electrode at the side is separated from the other electrode by about 1/32 in. It is screwed into the plug and in electrical connection with the frame of the engine. The sparks jump from the one electrode to the other and fire the charge in the cylinder.

For multi-cylinder engines fitted with H.T. magnetos there is not much difficulty in wiring up as there is fitted to the magneto a distributor, the only care to be taken is that the

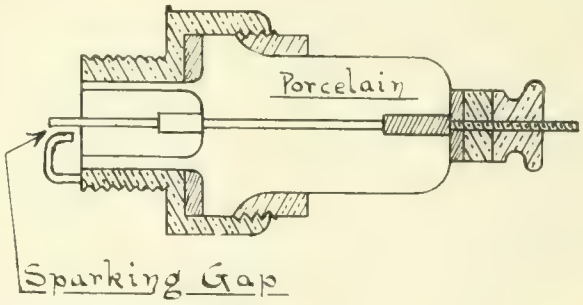


Fig. 10

proper wire is run to each cylinder. This may be checked by taking out the plugs and laying them on the top of their respective cylinders, the wires being connected to the plugs from the magneto and turning the engine, noting the order in which the sparks appear at the plugs. Then make sure that the spark in one cylinder occurs at the proper time, and from that and knowing the order in which the cylinders should fire the proper wires may be fixed to the plugs.

With coil and accumulator there are two ways, first, there may be a distributor, and one coil in which case the low-tension wiring to the distributor is similar to Fig. 8, and the high-tension wire from the coil goes to the distributor, and then there is one high-tension wire to each cylinder from the distributor.

In the other way there are one battery and as many coils as there are cylinders. Fig. 11 shows a two-cylinder arrangement.

Low-tension ignition may be by means of a battery and solenoid or by means of low-tension magneto. The ignition device, instead of the wipe contact and sparking plug, is "make and break." The principle underlying all make and break devices is that if wires are attached to the terminals of a battery and the free ends brought together, electricity will flow in the closed circuit, and when the ends are separated there will be a spark formed between the two wires.

Of course, this make and break in the circuit has to take place inside the cylinder at the proper time to fire the charge. Details differ in every make of engine, and the method illustrated in Fig. 12 is from no particular engine.

A is a stud which is insulated from the engine, having inside the cylinder a point B. The wire from the magneto or solenoid is connected to the outside of A. There is a rocking member D so made that it fits gas-tight through the cylinder walls, but is free to rock. Two lever arms are keyed on to D, one inside the cylinder and having a point C which comes in contact with the point B, as will be seen later on and another arm E outside, which rests on a projecting lu

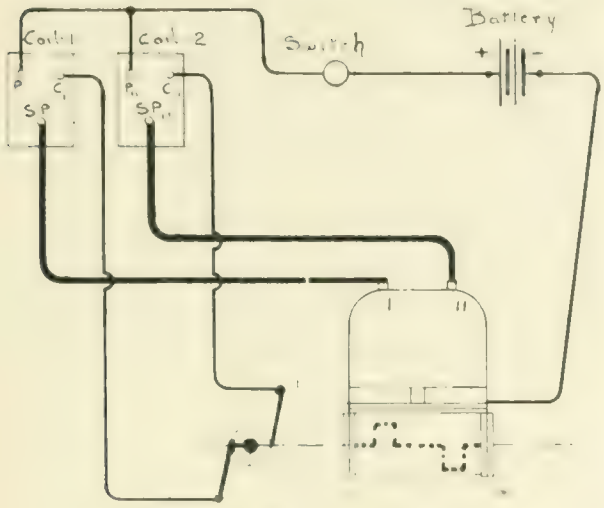


Fig. 11.

on the bracket G. This system of levers is not insulated from the engine frame. Attached to E there is a small spring F, the other end of which is fastened to a pin, so that when the system is in the position shown the spring is in tension. G is a guide bracket with a finger H on the under side. J is an eccentric, mounted on the half-time cam shaft, with an eccentric rod which drives the spindle K up and down. On one side of K there is a trigger piece L, the lower end of which is pressed out by a spiral spring. A large guided washer M and a spiral spring N complete the system.

In operation, as J revolves and raises K the trigger L raises the washer M at the same time. When M is rising the spring F causes the levers and pin E D C to begin revolving in a clock-wise direction until C and B are in contact. Current flows now through A, B, C, D and the engine frame back to the source of electrical supply. The finger H is now in contact with the projection of trigger L, and as the eccentric raises K still farther, L is slewed round the pivot pin, which fastens it to K, in an anti-clock-wise direction, which brings it out from supporting M. The spiral spring N has been compressed and, extending itself, causes F, D, C to rotate smartly

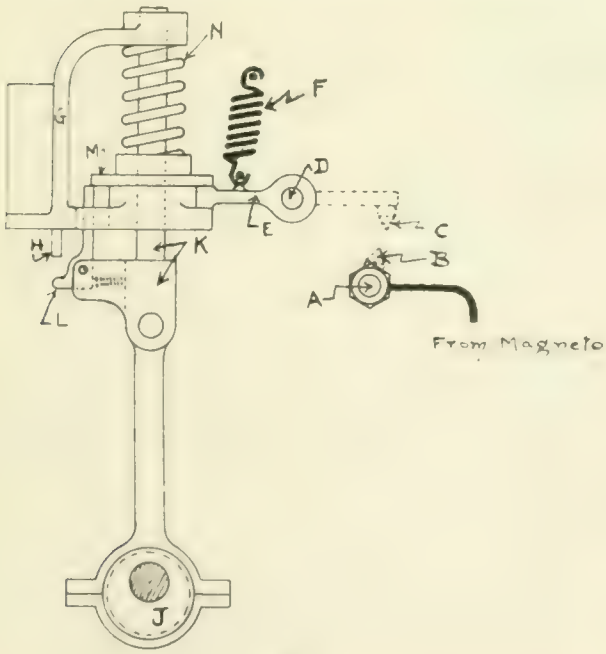


Fig. 12.

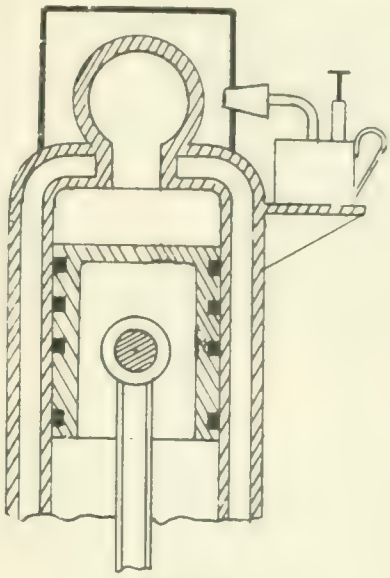


Fig. 13.

in an anti-clock-wise direction, breaking the electrical circuit and causing a spark to form between B and C. J, rotating farther, causes K to descend, when at the lowest point L, coming below K, is forced into its original position by the compressed spring between L and K.

The simplest form of automatic ignition is that known as "hot tube" ignition; this was almost universally adopted on land gas engines for very many years, but it had some drawbacks for marine work, namely, a lamp was required to keep the tube hot and the tubes, which were made of porcelain, were liable to get broken. Hot bulb ignition got over these difficulties, the general features being as shown in Fig. 13.

The cylinder is jacketed in the usual way, except the end which has a bulb cast on, which communicates with the compression space above the piston. When starting up the blow lamp is lighted and the flame plays on the bulb, the flame of the lamp being protected by a light cover of wrought iron. The oil is injected into the cylinder compression space by means of a small pump driven by an eccentric on the shaft; this pump sprays the proper quantity of oil into the cylinder in a fine spray, when the piston is just at the end of its stroke. Now when air is compressed quickly the temperature rises, and as the bulb at the top is heated to a dull red, the heat of compression and the radiant heat from the walls of the cylinder raise the mixture of air and oil vapour to a degree sufficient to cause combustion to take place. After the lamp has played on the bulb for about ten to fifteen minutes there is sufficient heat to fire the charge and the lamp may be extinguished, the explosions thereafter giving enough heat to maintain the bulb at that temperature which will ignite the compressed charge. It is interesting to note that oil vapour and air when compressed above atmospheric pressure will ignite at a lower temperature than when the mixture is at atmospheric pressure.

[illegible]

Messrs. John I. [illegible] their balance sheet [illegible] most satisfactory [illegible] for the year [illegible]

A [illegible] to Messrs. James Pollock, Sons & Co., Ltd.'s designs and [illegible] capacit[illegible] [illegible]

THE DIESEL OIL ENGINE, GEARED TURBINE AND SUCTION GAS ENGINE COMPARED WITH THE RECIPROCATING ENGINE.*

AT the meeting of the North East Coast Institution of Engineers and Shipbuilders, held on the 1st April in the Lecture Theatre of the Literary and Philosophical Society, Newcastle-upon-Tyne, a very interesting and valuable discussion was opened on the relative merits of three types of marine engines as compared with the reciprocating engine. The idea of the papers and discussion is to compare power installations of equal capacity for a vessel of given size. The President, Col. R. Saxton White, V.D., was in the chair. We have pleasure in reporting the papers, commencing with Mr. Orde's.

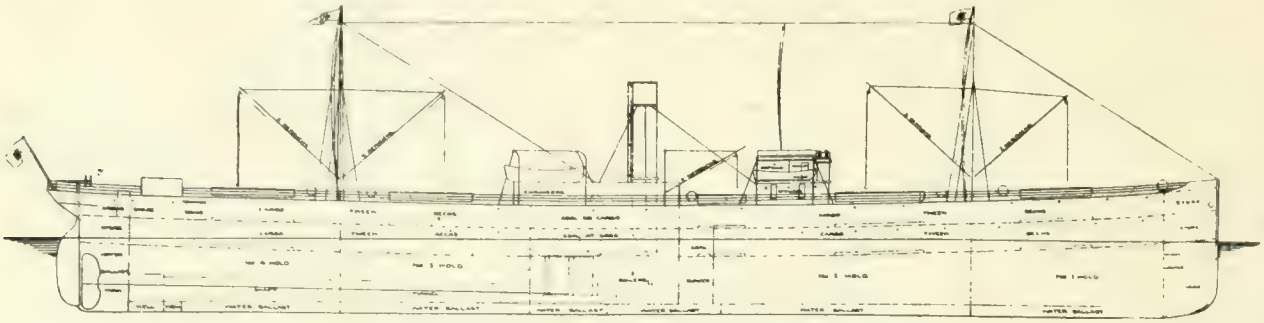


Fig. 1.—Shelter Deck Cargo Vessel propelled by Steam Engines.

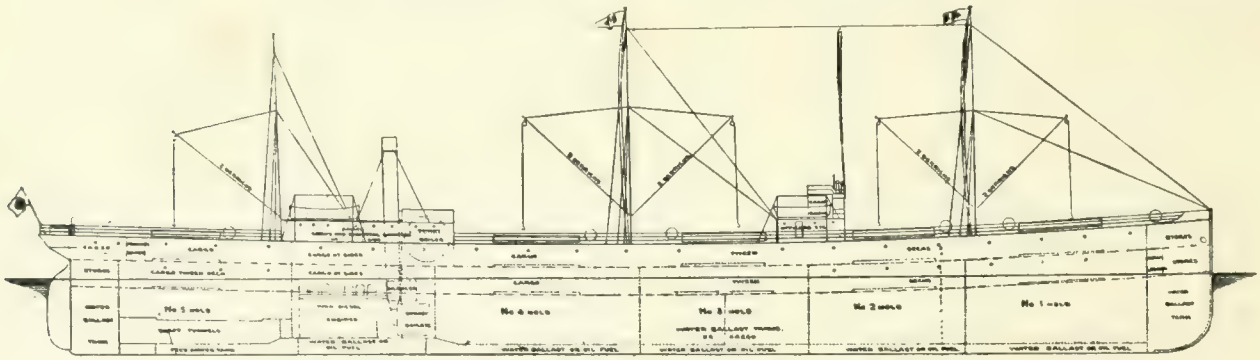


Fig. 2.—Shelter Deck Cargo Vessel propelled by Diesel Engines

THE DIESEL OIL ENGINE.

By E. L. ORDE, Esq.

Although much has been written on the subject of the Diesel engine as applied to the propulsion of sea-going vessels, it appears to the writer that the extent to which the earning power of a cargo vessel is affected by the adoption of this type of engine has not so far received the consideration at the hands of engineers and shipbuilders which it deserves. The importance of this question as a basis for discussion lies in the fact that a careful consideration of the best arrangements that can be made to utilize as far as possible the advantages of the Diesel engine, involves a number of points which in the present state of knowledge of the possibilities of this engine must be considered controversial if not largely conjectural. As a simple way of opening these questions the writer submits two outline plans. Fig. 1, showing a shelter deck cargo steamer, one of a number at present at work, and Fig. 2, the same vessel rearranged and fitted with Diesel engines. The general particulars of the two vessels are given in Table I.

An estimate of the cost of working the two vessels is given in Table II. as a model of the calculations that have been made with a view of showing the limits of fuel cost within which either type of propelling machinery may work economically. Such estimates can, of course, only be regarded as approximate, as the local conditions of particular trades, such as the convenient distribution of fuel stations, and many other influences, which only shipowners can assess at their true value, must exercise considerable effect upon them; but as most of the items in the estimate are common to both ships the general comparison is probably sufficiently accurate to form a basis for discussion.

3,500 mile tons is taken as the unit for the cost of working, as this represents a fair average voyage, and the bunkers in both vessels are arranged accordingly. The position of the engine-room in the Diesel ship is on the whole the most suitable in view of trim and ballast draught requirements, but the saving on the weight of the machinery and bunkers makes a deep tank necessary. The hull of the Diesel ship is more costly than that of the steamer, because of the fittings for twin screws, and the cost of oil-tight bunkers in addition to the deep tank.

The machinery space is as short as is compatible with a convenient engine-room arrangement, and the register tonnage of the two vessels does not show any very great difference. The propelling machinery in the steamship is of the usual 3-crank triple-expansion type, with cylinders 27 in., 45 in. and 75 in. by 48 in., and three boilers 14 ft. 6 in. by 11 ft. 6 in., fitted with Howden's forced draught. The actual results from a number of different voyages show an average of 2,400 I.H.P., and a consumption of 1·6 lbs. per H.P. per hour for all purposes.

The propelling machinery of the Diesel ship is of the single-acting 2-stroke cycle type, designed to develop 2,150 B.H.P. in ordinary service at sea, at about 115 revolutions. The propeller performance at 115 revolutions should be satisfactory, and it was considered unnecessary to make the form of the Diesel vessel any finer than that of the steamship, so that the comparison between the two is as close as it is possible to make it.

The two-stroke cycle engine was adopted partly in deference to Dr. Diesel's opinion as expressed on several occasions, and partly because the balance of advantages seems to be with it rather than with the four-stroke cycle engine. It is claimed on behalf of the four-stroke cycle that the fuel consumption is considerably (according to some authorities 10 per cent.) lower than that of the two-stroke cycle engine. This appears to be due: first, to a thermal superiority in the four-stroke cycle,

* Relative possibilities of the Diesel oil engine, geared turbine and suction gas engine as compared with the reciprocating engine for marine propulsion. A discussion introduced on the 1st April by E. L. Orde, Esq., Member, the Hon. Sir Charles A. Parsons, K.C.B., F.R.S., Vice-president, R. J. Walker, Esq., Member of Council, and A. C. Holzapfel, Esq., before the North-East Coast Institution of Engineers and Shipbuilders, Newcastle-upon-Tyne.

perhaps due to the greater effective length in the cylinder, and the longer scavenging period; and, secondly, to the mechanical superiority which arises from the absence of the scavenging pump. It seems doubtful, however, whether these gains can amount to 10 per cent. if balanced against the loss due to the idle strokes in the four-stroke cycle engine, and the general consensus of opinion so far as the writer is aware seems to be that the two-stroke cycle type is the better adapted for marine propulsion purposes. The weight is about 12 to 15 per cent., and the cost about 10 to 12 per cent. less than that of the four-stroke cycle engine.

The estimate of working shows how important it is to keep the first cost of the vessels as low as possible. The costs of the vessels which have been taken for the purposes of this estimate are not to be regarded as definite quotations, but are calculated on precisely the same basis, and are therefore comparable. The influence of cost and weight of machinery on the earning power of cargo vessels is considerable, and in choosing between the two and four-stroke cycle it deserves special attention, as a point is soon reached when the saving due to the lower consumption of the four-stroke cycle engine is counter-balanced by the capital charges on the higher cost and the loss on freight-earning cargo shut out by the extra weight of the engine.

This critical point depends on the length of the voyage, or the distance between fuel stations, and the cost of the fuel oil. In the vessels under consideration it appears to occur at about 3,500 miles, when the cost of the oil is 20s. per ton, and the limiting length of voyage decreases slightly as the cost of oil rises.

Fig. 3 is a diagram showing the comparative costs of working the two type vessels with fuel at prices ranging from 10s. to 50s. per ton. The ordinates are taken from a number of voyage estimates of which the model is shown in detail in Table II. The lower curve shows the cost per 3,500 mile tons of working the Diesel ship at a consumption of ·55 lbs. per B.H.P. and per hour; the upper the corresponding cost for the steamship at a consumption of 1·6 lbs. per I.H.P. and per hour. The comparison shows that with coal at 15s. per ton the cost of oil in the Diesel ship must not exceed 54s. per ton, as the economical limit within which the Diesel ship shows to advantage.

The high cost of Diesel engines and the important influence of capital charges on the earning power of cargo vessels largely affect the question of driving the auxiliary machinery, and it seems very doubtful whether electric power or compressed air can ever be used for this purpose without a considerable sacrifice, both in first cost and future earnings. In the type ship steam has been adopted supplied by two oil-fired boilers, one for use at sea, the other in port.

This question deserves very careful consideration, and it is to be hoped that some light may be thrown upon it during this discussion, as also upon the economy shown by Diesel-engined vessels as compared with steam when the latter are under banked fires. This item should considerably increase the difference between the two ships to the advantage of the Diesel vessel, but as the writer looks on the point as one which is largely conjectural, he has not attempted to deal with it in the estimate of working cost.

TABLE I.—SHELTER DECK CARGO VESSEL.

	Feet.	Inches.
Dimensions:		
Length overall	412	0
Length between perpendiculars	400	0
Breadth	52	0
Depth	29	9

	Steam Engines.	Diesel Engines.
Gross tonnage	4,655	4,800
Nett tonnage	2,930	3,030
Draught	26 ft. 1 in.	26 ft. 1 in.
Total deadweight in tons	8,640	8,775
Average sea power	2,400 I.H.P.	2,150 B.H.P.
Average sea speed in knots	10½	10½
Radius of action in knots	3,500	3,500
Fuel consumption—tons per day	42 (=2,400 I.H.P. at 1·6 lb. per I.H.P. hour.)	12·7 (=2,150 at ·55 lbs. per B.H.P. per hour.)
Freight-earning cargo in tons	7,880	8,530
Freight-earning cargo per ton, total D.W.	·914	·972
Freight-earning cargo per ton, gross register	1·69	1·77
Freight-earning cargo per ton, nett register	2·68	2·82
Capacity for cargo (grain) in cubic feet	488,000	523,800
Cargo capacity per ton of freight-earning cargo in cubic feet	62	61·5

TABLE II.—APPROXIMATE ESTIMATE OF THE COMPARATIVE COSTS OF WORKING STEAM AND OIL-PROPELLED CARGO VESSELS.

	Oil Engine.		Steam Engine.	
Capital.	£78,000.		£63,000	
	Per voyage.	Per month.	Per voyage.	Per month
Insurance	—	490		370
Fuel (oil at 40/-, coal at 15/-)	300	—	448	—
Wages and provisions		350		410
Wear and tear		110		100
Deck and engine room stores	—	110	—	100
Port charges at 5/- per ton	75	—	73	—
	1,115	1,060	1,180	980
16 voyages	17,840		18,880	
12 months	12 720		11,760	
	30,560		30,640	
5 per cent. depreciation	3,900		3,150	
Management	500		500	
	£34,960		£34,290	
Tons freight-earning cargo carried	16 × 8,530 = 136,480		16 × 7,880 = 126,080	
	34,960 × 240 = 8.390,400d		34,290 × 240 = 8,229,600	
	136,480	= 61·4d.	126,080	= 65·2d.

TABLE III.—LIST OF CREW.

	Coal Fuel.		Diesel Oil Engines.	
	Wages.	Provisions per day.	Wages.	Provisions per day.
	£	s. d.	£	s. d.
Captain	24	2 6	24	2 6
1st Officer	18	2 6	18	2 6
2nd ,,	16	2 6	16	2 6
3rd ,,	14	2 6	14	2 6
Carpenter	7	1 6	7	1 6
Steward	7	1 6	7	1 6
2nd Steward	6	1 6	6	1 6
Cook	6	1 6	6	1 6
Boatswain	6	1 6	6	1 6
Storekeeper	6	1 6	6	1 6
10 A.B.'s at £5 10s. od.	55	1 6	55	1 6
Chief Engineer	22	2 6	22	2 6
2nd ,,	16	2 6	16	2 6
3rd ,,	12	2 6	12	2 6
4th ,,	10	2 6	10	2 6
12 firemen at £6 0s. od.	72	1 6	36	1 6 (six greasers)
1 donkeyman	7	1 6	7	1 6
(37 men) per month	£304	£100	£268	£75 (31 men)
Wages	304		268	
Provisions	100		84	
Per month	£404		£352	

GEARED TURBINES.

By THE HON. SIR CHARLES A. PARSONS, K.C.B., F.R.S., AND R. J. WALKER, Esq.

The object of the present contribution to this discussion is to lay before the members of the Institution a few brief notes as to the possibilities of geared turbines when applied to vessels of moderate and slow speeds. When considering such propositions, the relative earning power, first cost and reliability of the propelling machinery must necessarily be taken into account as being of first importance to the shipowner.

The principal advantages of geared turbines as compared with triple-expansion engines may be summarized as follows: Increased economy in coal and oil consumption; absence of racing in rough weather; reduced wear and tear of engines; reduced stress on screw shafting, due to even turning moment of engines and absence of racing; reliability of running in all weathers; reduced weight of machinery; increased deadweight cargo, due to increased economy in coal consumption and reduced weight of engines. Referring to the question of efficiency and economy in steam consumption, so far as the turbine is concerned the principles upon which economy and efficiency depend are identical with those which hold good in steam turbines for land purposes; but for ship propulsion not only has account to be taken of the efficient use of steam in the turbines, but also of the propulsive efficiency obtainable by the combination of the most efficient turbines with the most efficient propeller.

In the higher speed vessels to which the turbine has hitherto been applied, a judicious compromise between turbine and propeller efficiency has been arrived at by accepting a slightly higher speed of propeller than would obtain for maximum efficiency and lower rates of revolutions for the turbines than is obtainable with advantage in turbines for land purposes. It has not, however, been found practicable (compatible with weight and first cost) to apply the turbine direct to the propeller shaft in vessels of moderate speed, say of designed speed of say 15 knots and under on account of the comparatively low rate of revolutions necessary for reasonable propeller efficiency at such speeds.

The problem of applying the steam turbine to vessels of moderate and slow speeds, however, may be said to have been satisfactorily solved in the association of mechanical gearing with high-speed turbines. By the interposition of gearing between the propeller and the turbines such limitations in propulsive efficiency are not met with inasmuch as the maximum efficiency of turbine and propeller can be obtained independently of each other.

The comparative trials that were carried out in the *Vespasian* with geared turbines and the reciprocating engines which were originally fitted in that vessel showed a gain of economy in steam consumption of over 15 per cent. in favour of the geared turbine engines. It has been stated by some engineers that the reciprocating engine with which the geared turbines was compared did not represent the best that could be obtained with a modern triple-expansion engine, whilst on

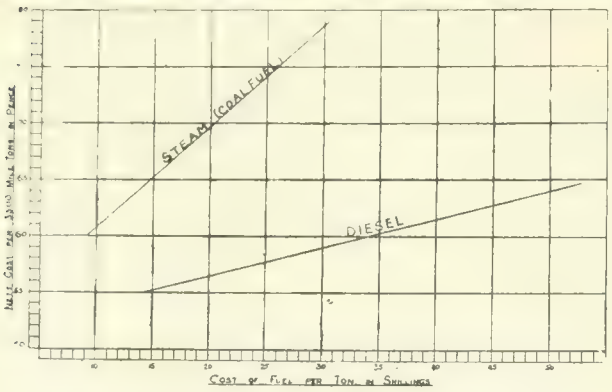


Fig. 3.—Comparative costs of working Steam and Diesel-propelled Vessels at fuel rates varying from 10s to 50s.

the other hand others confirm the result of steam consumption obtained as representing a very fair average for that particular class of reciprocating engine. It is not professed, however, that the results obtained with the geared turbines in the *Vespasian* (the machinery in that vessel being somewhat experimental) are the best that can be obtained with geared turbines. As a matter of fact, a consumption of saturated steam of about 12 to 13 lbs. per S.H.P. for the main engines could be confidently expected, which would be equivalent to about 11 to 12 lbs. per I.H.P. of reciprocating engine, assuming a ratio of shaft horse-power to indicated horse-power of 90 to 92 per cent.

The results of the trials of the geared turbine ship *Normannia*, the first of the two new vessels for the London and South-Western Railway Company, were dealt with in a paper read by Professor Biles before the Institution of Naval Architects (reported in our issue of April.—Ed. *Marine Engineer and Naval Architect*). The horse-power of the *Normannia* is 5,000, divided over two shafts. Her propelling machinery consists of a high and low-pressure turbine geared to each propellor shaft. The steam consumption of the turbines was shown on the official trials to work out at 12 lbs. per S.H.P. as compared with the estimate of 12½ lbs.

As illustrating the possibilities of still further increasing the economy in steam consumption, it may be said that if experience in actual service for any lengthy period has shown that superheaters can be successfully applied on board ship, and the shipowner is prepared to adopt same, then a further saving in steam consumption can thereby be effected in geared turbines. Superheated steam has been in use on turbine installations for land purposes for a considerable period, and of late years superheats of 50° to 250° in land turbines have become almost universal. The saving in steam consumption as ascertained with land turbines is about 1 per cent. for every 10° of superheat, so that with, say 100° of superheat a saving of about 10 per cent. can be effected in the steam consumption, but when referred to fuel consumption it should be stated that the percentage of saving in coal is not so great as a certain amount of coal is expended in producing the superheat. As regards the question of economy in fuel consumption, there is the possibility in certain trades of adopting oil fuel with advantage.

It has, we think, been clearly demonstrated that for certain classes of vessels considerable advantage accrues from the use of liquid fuel. The evaporative efficiency per ton of fuel is about 40 to 50 per cent. greater than with coal; less space is required in the stokeholds, and the handling of the fuel is reduced to an absolute minimum, as the feeding to the boiler is carried out mechanically by means of pumps.

Mr. Harold Yarrow, in his very interesting paper read before the Institute of Naval Architects recently on "The results of some experiments with a water tube boiler having special reference to superheating," (reported in our April issue Ed. *Marine Engineer and Naval Architect*) incidentally gives some useful figures as to evaporative efficiency with oil fuel. For a moderate degree of air pressure it is possible to obtain an evaporative efficiency of 13½ to 16 lbs. of water per lb. of oil from and at 212° Fahr. This would be equivalent to an actual evaporation of about 14¾ lbs. of water per lb. of oil, with a feed water temperature of about 190° and a boiler pressure of 180 lbs., as compared with an evaporative efficiency of about 10 lbs. with coal.

The possible racing of the turbines and gearing in a heavy seaway, the wear of the teeth of the gear, and the reliability of the machinery generally have been advanced as objections to the geared turbine sustem. We think, however, that the working of the *Vespasian* has shown that any such fears are quite groundless. Since the *Vespasian* was first put on service with her new propelling machinery, she has completed some sixty-two voyages between the Tyne and the Continent, covering a distance of over 37,000 miles. During this period some exceptionally rough weather has been experienced, especially when steaming in light condition, and one of the most noticeable features in her running has been the remarkable freedom from racing of the engines in the roughest weather. The gearing has not given the least trouble nor has any appreciable wear been detected in the teeth of the pinions or gear wheels since she was first put on service nearly two years ago.

We are indebted to Mr. Orde for the principal dimensions and particulars of a typical cargo vessel fitted with triple expansion engines, with which we have been able to formulate a statement as to the possibilities of geared turbines when compared with triple-expansion engines. In Tables 4 and 5, column A, particulars are given for the vessel with triple-expansion engines. The particulars in column B refer to a proposal of geared turbines on a single shaft, and in column C for geared turbines with twin screws.

TABLE IV.

Type of propelling machine.	A. Triple expansion engines.	B. Geared turbine.	C. Geared turbine.
Number of propellers	1	1	2
Revolutions	66	66	110
Diameter of propeller	18 feet	18 feet	12 feet
Pitch of propeller	18 feet	18 feet	12 feet
Length of vessel B.P.	400 feet	400 feet	400 feet
Breadth extreme	52 feet	52 feet	52 feet
Depth moulded	29 ft. 9 in.	29 ft. 9 in.	29 ft. 9 in.
Deadweight	8,465 tons	8,535 tons	8,540 tons
Draught of water	26 ft. 1 in.	26 ft. 1 in.	26 ft. 1 in.
Displacement	11,760 tons	11,760 tons	11,760 tons
Speed of service	10½ knots	10½ knots Equivalent	10½ knots Equivalent
I.H.P.	2,400	2,400	2,400
S.H.P. assuming ratio S.H.P. to I.H.P. of 90 per cent	-	2,160	2,160
Weight of propelling machinery:			
Propeller shafting, thrust block and fittings aft of engine-room after bulkhead	64 tons	64 tons	62 tons
Engines, condensing plant, auxiliary machinery and all fittings within engine-room	180 tons	146 tons	143 tons
Boilers, fans, funnels and all fittings within boiler rooms	281 tons	245 tons	245 tons
Total steaming weight	525 tons	455 tons	450 tons

TABLE V.

	A	B	C
Estimated [illegible] consumption [illegible] saturated steam [illegible] per I.H.P.	[illegible]	[illegible]	[illegible]
Estimated steam [illegible] consumption of auxiliaries per I.H.P. of main engines..	[illegible]	[illegible]	[illegible]
Estimated [illegible] consumption [illegible] saturated steam main engines per S.H.P.	[illegible]	11·8	11·2 lbs.
Estimated [illegible] consumption of auxiliaries per S.H.P. of main engines	[illegible]	[illegible]	[illegible]
Estimated total [illegible] consumption of saturated steam per S.H.P. all purposes	[illegible]	[illegible]	[illegible]
Estimated total consumption of saturated steam per I.H.P., all purposes	[illegible]	Equivalent 11·7	Equivalent 11·2
Estimated coal consumption per I.H.P., all purposes	[illegible]	Equivalent 1·17	Equivalent 1·12
Estimated coal consumption per S.H.P. all purposes	[illegible]	[illegible]	[illegible]
Estimated consumption of steam [illegible] superheat per S.H.P. main engines	[illegible]	[illegible] lbs.	[illegible] lbs.
Estimated consumption auxiliaries per S.H.P. of main engines	[illegible]	[illegible]	[illegible]
Estimated consumption of steam [illegible] superheat for all purposes per S.H.P. main engines	[illegible]	11·8 lbs.	11·4 lbs.
Estimated steam consumption per I.H.P. of main engines with [illegible] superheat, all purposes	[illegible]	Equivalent 11·6	Equivalent 10·2
Estimated consumption of oil per I.M.P. saturated steam, all purposes	[illegible]	Equivalent ·81	Equivalent ·78
Estimated consumption of oil per S.H.P. (saturated steam), all purposes	[illegible]	[illegible]	·86
With oil fuel and [illegible] superheat—estimated oil consumption, all purposes per I.H.P. of main engines.	[illegible]	Equivalent ·76	Equivalent ·7
With oil fuel and [illegible] superheat estimated oil consumption, all purposes, per S.H.P. of main engines	[illegible]	88 lbs.	81 lbs.

The auxiliaries in the turbine proposals are all independently driven. The air, circulating and feed pumps in the main engines in the reciprocating engine vessel are all feed pumps and other exhausts have to be accounted.

At the time of [illegible] the [illegible] and [illegible] the [illegible] and [illegible] with [illegible] generated [illegible] Therefore all reference to [illegible] with superheat have been omitted from Table V. The saving in steam consumption in the geared turbine proposal for oil superheat has been [illegible] per cent and the saving in oil fuel [illegible] per cent.

Fig. [illegible] shows an arrangement of geared turbines having a single screw, consisting of two turbines [illegible] high-pressure and one low-pressure turbine. At [illegible] the high-pressure turbine is connected with a flexible coupling between the [illegible] and the turbine, the pinion is [illegible] and [illegible] to the propeller shaft. The reversing turbine is [illegible] in the [illegible] casing of the low-pressure turbine. The [illegible] gear wheel is about 12 ft. and of the pinion [illegible] The total width of the face of the wheel is 2 in. The inclination of teeth [illegible] axis is helical. The revolutions of the propeller would be [illegible] per minute.

Fig. [illegible] shows an alternative arrangement of turbines arranged on two shafts, consisting of one high-pressure and intermediate turbine and two low-pressure turbines, steam being admitted to the H.P. turbine on the side of the vessel exhausting into the I.P. turbine on the opposite side of the vessel, and thence from the I.P. turbine to each low-pressure turbine and to the condenser. A reversing turbine is fitted in the exhaust casing of the low-pressure turbine. For manœuvring [illegible] arrangement of valves and pipes, the turbines on one shaft of the vessel can be arranged to work independently of the turbines on the other shaft. The [illegible] gear wheel would be about [illegible] ft. [illegible] and the pinion [illegible] in. Revolutions of propeller [illegible] and the turbines about [illegible]

The machinery for both proposals has been arranged in the same space as that for the reciprocating engined vessel under column A of Table IV.

In conclusion, it may be mentioned that, apart from the question of superheat or oil fuel, a saving of [illegible] per cent in coal consumption on a vessel of the dimensions and power stated in the paper should represent a considerable financial gain per annum to the shipowner. Assuming an average of 260 steaming days per year, such a vessel with reciprocating engines of [illegible] I.H.P. would consume [illegible] tons of coal per annum. A saving of [illegible] tons at an average value of [illegible] per ton would give [illegible] every ton of coal saved an additional ton of cargo could be carried. The value of this cargo would, of course, depend on the trade the vessel was engaged in, but assuming a value of [illegible] per ton, the additional freight would be equivalent to about [illegible] Then again, there is the additional [illegible] which could be carried corresponding to the reduction in weight of machinery, so that taking these [illegible] the gain to the owner would be a considerable figure, [illegible]

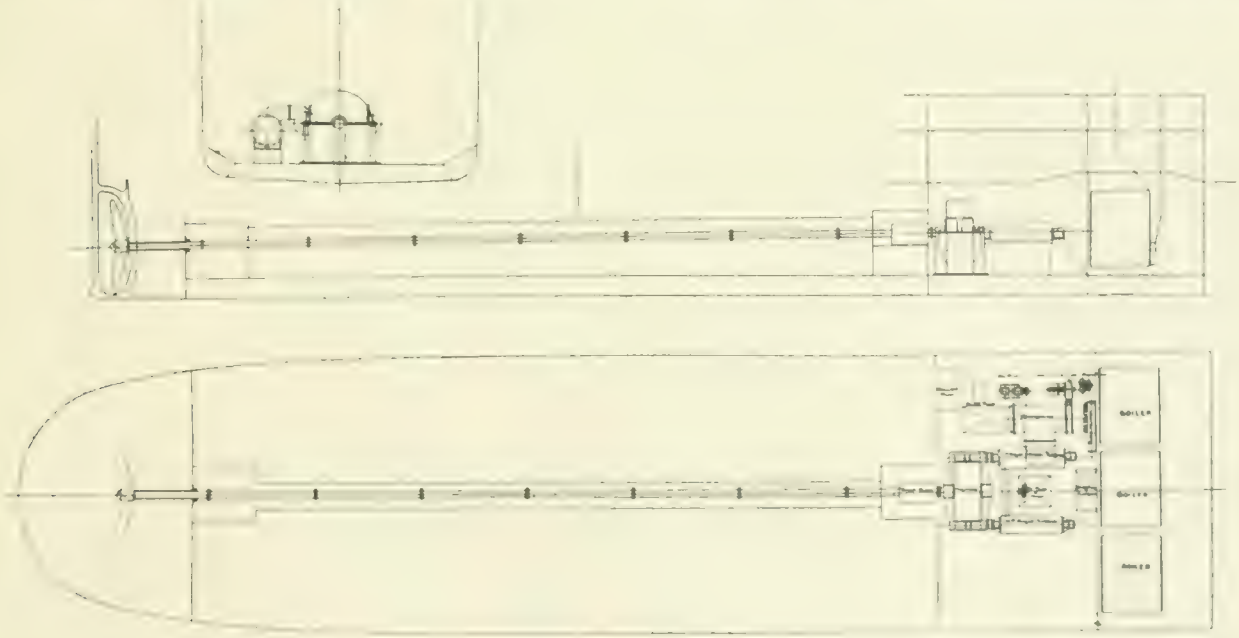


Fig. [illegible].—Single Screw Cargo Steamer Arrangement of Turbines and Gearing

EXPLANATORY NOTES IN CONNECTION WITH TABLES IV. AND V.

The ratio of shaft horse-power for the turbine proposal to indicated horse-power of the reciprocating engine proposal has been taken as [illegible] per cent, which agrees with that obtained in the trials of the [illegible]. The weight of boilers for the reciprocating engined vessel has been reduced by [illegible] per cent for the turbine proposals in view of the saving in steam consumption. The hull weight of proposals under columns B and C has been increased to correspond to the saving in weight of reciprocating machinery and boilers. The consumption of the reciprocating engined vessel under A has been assumed at [illegible] lbs. per I.H.P. all purposes. The figures [illegible] for the geared turbines are based on the results of a trial [illegible] of water consumption of previous vessel. The corresponding figures for water per lb. of coal has been taken as [illegible] lbs. per lb. of coal with a feed temperature of [illegible] and a boiler pressure of [illegible] lbs., the auxiliary exhaust being utilized in heating the feed water and in the case of the reciprocating engine vessel being supplemented with steam taken from I.P. receiver of main engines.

SUCTION GAS ENGINE.

By A. C. [illegible], Esq.

[illegible]

	Feet.	Inches.
Length overall	412	0
Length between perpendiculars	400	0
Breadth extreme	52	0
Depth moulded	29	0
Draught	26	1
Deadweight	8,465 tons.	
Displacement	11,500 tons.	
Speed at sea	10½ knots.	
Indicated horsepower	2,000.	

If fitted with reciprocating engines and steam boilers, this vessel will have an engine room about 48 ft. long; and to obtain the usual reduction in registered tonnage for engine spaces, I propose to maintain the same length of engine-room. I also propose to give the vessel twin screw engines, on account of the greater security, and to have everything connected with her power installation as nearly as possible in duplicate. I propose to start the main engines by electricity, and to use no compressed air. I also propose to have all auxiliary machinery, such as steering gear, winches, tar extractors, pumps and fans electrically driven.

Producer-Plant.—I propose to have four producers about 5 ft. 6 in. square by 15 ft. high. These would each be capable of giving sufficient gas for 750 H.P., so that the total gas plant would be suitable for 3,000 H.P. These four producers I propose to place in a recess 15 ft. by 15 ft. amidships, abaft the fore engine-room bulkhead. They would rest either on the tank tops or on a platform a few feet above the keel. The recess would be completely shut off from the engine-room and other parts of the vessel by gas-tight bulkheads, but would be entered from engine-room by a gas-tight door. It would reach right to the upper bridge deck, but just on the level of the producer tops there would be a platform from which the coals would be filled into the hoppers. At the sides there would be a grating allowing of ample ventilation, and there would be another grating level with the upper bridge deck. The bunker coals would be in 'tween deck side bunkers reaching to the sides of the recess, and there would also be a spare bunker in the lower hold at the front of the fore engine-room bulkhead, from which the coal could be raised to the coaling platform by an electric hoist. Of course, the gas plant is intended to use bituminous coal for fuel, and each producer would therefore be fitted with four openings at the top for stoking. These would be closed by the usual perforated cannonball arrangement; but to prevent leakage of gas, a screw-down cap would be fitted over each cannonball and would be closed when the openings were not in use. All the pipes leading from the producers to the coolers would be in the middle of the recess, so as to be easily accessible. The cooling towers would be placed on a platform just above the water level and would be four in number, about 7 ft. diameter and 20 ft. high. By placing the coolers or scrubbers above the water level, the exhaust water can flow overboard on either side by gravitation. They would be filled either with earthenware tubes or earthenware balls of special design. The top portion of each cooler would be a water tank about 3 ft. deep. From the coolers, the gas would pass to two centrifugal tar extractors electrically driven, each taking about 25 H.P. So far as I am aware, perfect gas is being obtained from bituminous coal by means of these tar extractors which have now been fitted in many hundreds of installations. From the tar extractors the gas would pass under slight pressure induced by the fans of the tar extractors, to two dry scrubbers, and thence to the engines. The water vapour for the gas would be obtained by a Holzapfel patent duplicate vaporizer fitted to the exhaust. This vaporizer consists of two cylinders into which sea-water is pumped under slight pressure and through which the exhaust gases pass, through tubes about 2 in. diameter. There is a constant drip of brine from these cylinders equal to about half the water pumped in. A small quantity of kerosene is also pumped in, and while preventing or reducing incrustation, it helps, after vaporizing, to enrich the gas in the producers. The exhaust can be so arranged as to pass through either or both of these cylinders, and they are both fitted with hand holes and manholes for removal of incrustation, the idea being to clean one if necessary while the other one is in use. They also act as efficient silencers without reducing the power of the engine.

Gas Engines.—For prime movers I propose to have two six-crank gas engines, each of about 1,400 brake H.P. Owing to the somewhat elastic platform on board ship, I consider six cylinders most essential, as otherwise vibration is too considerable. While there would be no difficulty in getting 1,400 H.P. into six or less cylinders, I propose in this case to employ two tandem engines, each of twelve cylinders, the cylinders being small enough to make piston cooling unnecessary. The cylinders of these engines would be about 20 in. diameter and the stroke 18 in. At 300 revolutions per minute, this would give a piston speed of 900 ft. per minute.

The diameter of the upper row of cylinders can be increased and that of the lower row reduced in order to permit of the withdrawal of the piston through the upper cylinder. Diameters of 22 in. have been successfully used without piston cooling. In front of each engine I would place a dynamo of about 90 H.P., and in front of the dynamo again an oil or paraffin vertical engine about 100 H.P. These latter would be used *in port* to generate the necessary electric power for eight winches and for lighting and ventilation. Either or both the dynamos would be driven by the main engines *while at sea*, but as the power required for the steering gear and tar extractors, fans, pumps and lighting, would probably be under 80 H.P., only one dynamo would be in gear while the vessel is at sea and the other one would remain as a *stand-by*. I propose to start the main engines by means of the dynamo and oil engines. This would be quite easy as it will be seen later on that there would be no load on the engines when they are started.

As regards ignition, either high and low-tension Bosch magneto, or else low-tension Bosch magneto and Lodge accumulator ignition would be used. It is desirable to have two ignitions and separate sparking plugs to each cylinder.

Transmission Gear.—The gas engines not being reversible, I propose to fit to each engine a Fottinger transformer, so adjusted as to reduce the revolutions from 300 to 100 on the propeller shaft. Sufficient has been written and said about the Fottinger transformer to make a description of this superfluous. My own experience with the transformer on board the *Holzapfel I.* is a perfectly satisfactory one, and its rapidity of action is remarkable, while practically no attention to it is required by those in charge.

One of the advantages of the transformer to which I should here call attention is, that when the lever of the transformer is placed at neutral, the prime mover, or gas engine, will run without load. It is therefore possible to start each gas engine with the 100 H.P. oil engine at the fore end of the dynamo. A further advantage is that when the transformer stands at neutral, the propeller shaft can revolve freely, enabling, for instance, an auxiliary sailing vessel or yacht to sail without any drag from the propeller. The fact that the propeller runs loose when the transformer stands at neutral will also make the transformer eminently suitable for war vessels, which frequently have to run at cruising speed. For such vessels the power necessary for cruising speed can, for example, be delivered to one propeller in the middle, while the side turbines, which may be made more powerful than the middle one, are at rest, and the side propellers by means of the transformer can freely revolve while the middle propeller alone is working. I consider the transformer would absorb about 12 per cent. of the total power delivered by the gas engine, and assuming that at sea the gas engines produce 2,800 H.P. less 100 H.P. absorbed by one dynamo, and deducting 12 per cent. from the remaining 2,600 H.P., the transformer would deliver about 2,376 brake H.P. to the propeller shafts, which are fully equal to the 2,000 indicated H.P. stipulated by your committee. The cost of this power would be at the rate of nine-tenths of a lb. of bituminous coal per brake H.P. per hour, a rate freely guaranteed by gas engine builders. This is exactly 26½ tons per twenty-four hours continuous running on the 2,800 brake H.P. of the prime movers, and includes steering gear, lighting, pumps and ventilation.

In regard to the quality of coal used, the Power Gas Corporation claim that any quality of coal can be used in their producers, but on my part, I always discriminate in favour of a dry coal with not too strong a tendency towards caking. A coal as free as possible from slag should always be selected. As regards size, small and nuts are preferable and make a good mixture. Coal suitable for this purpose can generally be bought on the Tyne at an average price of 8s. or 9s. per ton, and in the Welsh ports at 1s. or 2s. more.

Space Occupied.—The length of 48 ft. would be more than sufficient for the continuous length of the transformer, gas engine, dynamo and oil engine. The latter would reach

slightly beyond the recess containing the producers. There would be no lower bunkers in the engine space but a 'tween deck bunker of considerable size would be fitted level with the top of the producers or about 20 ft. 6 in. above the top of the keel, giving a bunker of about 7 ft. 3 in. deep and about 18 ft. wide on either side practically the full length of the engine room. This would give about 180 tons of bunker space in each 'tween deck bunker. I take it that accommodation for engineers would be on a bridge deck above the 29 ft. 9 in. moulded depth of the vessel. The engine room would be exceedingly roomy and airy with this arrangement and would also have a large amount of top light available.

Weight of Installation.—I estimate the weight of the gas plant, including cooling water in the tanks of the cooling towers and fuel in the producers, at about 220 tons; that of the two gas engines at 120 tons; two transformers, including water, at 60 tons; two oil engines and dynamos at 25 tons; pumps, electrical motors, gas pipes, coolers, etc., complete, at a further 50 tons; which makes a total of 475 tons.

As regards the cost, the two gas engines would cost about £7,500; two transformers, £4,000; gas plant complete, about £2,000; oil engines, dynamos, steering gear, electric winches and windlass, about £3,200; total, about £16,700. These figures are based on estimates obtained by me some little time ago. It will be realized, first, that as regards fuel consumption the gas engine is by far the most economical motive power for ships; secondly, that by its use in conjunction with electrical auxiliary machinery great economies in fuel consumption would also be effected; thirdly, that although the cost of such an installation at the present time is about equal to, or somewhat in excess of, a steam installation of equal power, there is no doubt that when this class of work has been standardized and produced under stress of competition it can and will be supplied at considerably lower prices than the present steam power installations.

Lastly, I would submit to this Institution that while oil has to be imported from abroad, and while oil strata cannot be measured, there is consequently no guarantee of a continuity of supply. Also, while the production of oil is under the control of a few powerful financial groups, one or two of which have in the past manifested strong monopolistic tendencies, we have on the other hand an unlimited supply of suitable coal in strata which has been carefully calculated by our geologists and which is produced under conditions of free competition.

Before concluding, I think it would interest the meeting if I referred to some of the improvements in gas engined vessels which have suggested themselves to me from my experience with the *Holzapfel I.* These relate almost exclusively to the gas plant.

Producers generally are lined with firebrick. Clinker readily forms on the fire bricks and has to be removed by stoking tools when the bricks are apt to be broken or loosened. A different lining should be adopted, and I have suggested steatite as a substitute, as clinker is not likely to adhere on a steatite surface. Experiments so far made have not been successful, probably owing to the quality of the steatite. I still consider that blocks of pure steatite will prove to be the best lining.

When the gas engines are suddenly stopped, gas is apt to develop in the producers. At such times a safety blow off is opened. This is generally fixed low down on the gas pipe leading from the producers to scrubbers, where it can be shut off by water entering the pipe. It should be fitted at the top of the gas pipe, where there is no danger of water shutting off the gas. The handles for opening the valves of this blow off should be so arranged as to be near the throttle valve of the engines in order that the engineer may open them the moment he has stopped the engine.

The pipes leading from producers to scrubbers should be so arranged that water cannot possibly enter into them while the ship is pitching and rolling about at sea, i.e., they should slant downwards just before entering the scrubbers.

Scrubbers are generally filled with furnace coke. This is not suitable for a sea-going vessel and should be substituted by earthenware balls or tubes of good strength and of a design to give a maximum of cooling surfaces. All the troubles and delays of the *Holzapfel I.* were due to the inadequate appreciation of these facts in the beginning. All the faults have now been remedied and a useful, but expensive, lesson has been learnt.

I would finally submit that the gas engine and gas plant in their present form are capable of vast improvements, and are well deserving of the devotion of that brain energy and ingenuity which British marine engineers have in the past so successfully devoted to steam power.

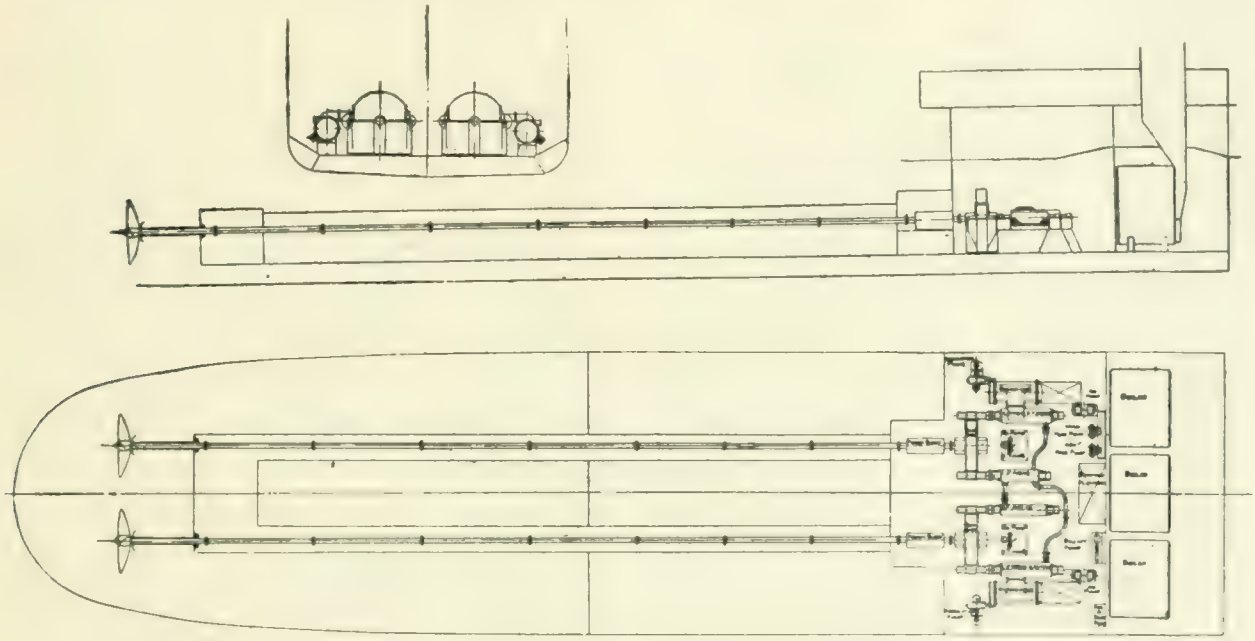


Fig. 5.—Twin-Screw Cargo Steamer. Arrangement of Turbine and Gearing.

FATAL ACCIDENT AT MANORA POINT, KARACHI.—While making use of oxy-acetylene plant at Manora Point a very sad accident happened by a gas explosion which resulted in the death of Mr. Stephens, the chief engineer of the *Bassano* and injuries to the fourth engineer, also to Mr. J. D. Fraser, superintendent engineer to the Karachi Port Trust. As the fourth engineer is reported to be a son of the chief engineer who was killed, the occurrence was an extremely unhappy one.

SMOKE ABATEMENT EXHIBITION.

THIS exhibition was open from March 23rd to April 4th with the Duke of Argyle as president, and Sir W. B. Richmond vice-president representing the Smoke Abatement Society, under whose auspices the exhibition was inaugurated, the organizing being carried out by Mr. F. Budges. It is interesting to note from the catalogue that in 1257 the smoke from "seacoles" was so offensive to Queen Eleanor that she shortened a visit to Nottingham, while sixteen years later the use of coal was prohibited as injurious to health. In 1306 a Royal Proclamation prohibited coal for furnaces in industrial work and in the following year a Commission was set "to inquire of all such who burnt sea cole in the city and parts adjoining and to punish them for the first offence with great fines and ransoms and upon the second offence to demolish their furnaces." The scarcity of wood rendered the use of coal imperative and in 1819 a Committee was formed to compel those using steam engines to erect their furnaces in a way less prejudicial to health and comfort. The committee expressed the view that "the nuisance so universally and justly complained of may at least be considerably diminished if not altogether removed." During recent years, legislation and the Smoke Abatement Society have tended to reduce the smoke nuisance as far as possible; handbooks have also helped by giving directions and hints to those who handle coal, while exhibitions similar to the one under review have been of great service to engineers and the public in drawing attention to the ways and means of assisting to prevent smoke vitiating the air. As the scarcity of wood and the expense of preparing peat for industrial use forced coal with its offensive smoke upon the market, so during the past months the scarcity of coal has taught wholesome lessons in economy and of substituting other fuels or means of producing power, and some of these lessons were exemplified at the exhibition stalls.

The electricity hall and restaurant combined, devoted to demonstrations of cooking, heating, ironing, lighting and applications of power by means of electric current, was thronged with visitors, giving evidence of popularity, with the reflection that for ship as for land service, cleanliness and adaptability were here made manifest. Lectures were given and conferences held on the following and other similar subjects:—"The influence of smoke on decorations," also "on metal work," "smoke and fog;" smoke nuisance at Kew Gardens; smokeless production of steel; the campaign against smoke; wasteful power production; stoking; solid smokeless fuels; suction gas plants; hand-fired boilers; qualification of stokers; overloading of steam boilers, etc. It will be noted that these subjects appeal for consideration to all, while to engineers the last six named appeal specially. Cooking and heating appliances for gas were exhibited at several stalls, while lectures arranged by the Gaslight and Coke Company, were given from time to time, also demonstrations whereat the observers and observed appeared equally to enjoy themselves, as the young men volunteer cooks pared their allotted potatoes, kneaded dough for table bread and cooked the results of their handiwork, also tomatoes and chop, presenting the lot, each on his own tray, to be judged for prizes. The Carron Iron Works had a fine display of grates and stoves set out with ample space, as also had the Falkirk Iron Co., each vieing to suit different tastes of customers, and species of fuel, while the Premier, Eagle and Lion ranges were represented at different stalls and their merits discussed each by its set of admirers. Various species of smokeless fuel were exhibited both in bulk and in grates to prove by results their superiority over ordinary coal. Babcock & Wilcox showed their chain grate stoker, and Ruscoe & Co. their mechanical stoker and elevator, which call to mind that the desirability of having a good steady mechanical stoker for marine boilers is becoming more and more manifest. Jelly and Co. had on view a ventilating and dust-extracting plant of considerable interest. The Crosthwaite patent furnace for boilers of all kinds to ensure smokeless combustion and durability of firebar, was on view; Ozonair, Limited, attracted attention to their different apparatus for purifying and revivifying the atmosphere. Houghton Metallic Co. were well represented by their various manufactures of metal thread-packing, valves, cocks, pumps and fittings specially prepared to resist acids and vapours otherwise detrimental to metals. A very interesting model of coal screening and washing plant, arranged for electric drive, was exhibited by Witting Bros.; the whole operation was clearly shown and formed a good object lesson. Special firebars and furnaces were to be seen and studied at the stands of J. & P. Hill, Bean's Bunsen Smokeless Furnaces Co., D. F. Davis, Bennis & Co. and the Direct Gas Fuel Co.

MARINE MOTOR NOTES.

THE coming of the motor ship will have an effect upon the amount of non-ferrous metals used in the marine engine, and it will be interesting to note the various exhibits at the Agricultural Hall (Islington) in June, to gauge the area of industrial life and work embraced under the scope of the Exhibition. Some twenty-five years ago most of the marine machinery had main steam pipes of copper, the weight of which, for a 2,000 I.H.P. set of engines would amount to about 1·2 tons, the auxiliary steam pipes to about ·3 tons, while the feed, circulating, air and other pumps would be about 1·4 tons, also the brass and copper in the condenser about 5·1 tons, or about 8 tons in all. In more recent practice the weight of copper has been greatly reduced by the introduction of steel steam pipes for the straight lengths and even for the bends. In turbine steamers there has been a further reduction of non-ferrous metals by the elimination of the cranks and connecting rods, the weight of pipes being about the same, also the condenser. The oil or spirit motor engine dispenses with copper pipes and condenser, leaving only the water and a few auxiliary pipes in the engine-room to be reckoned with. The deck pipes for winches, windlass and steering engine may be also left out, in the event of the deck machinery being electrically driven. The *Selandia*, which arrived at Singapore about mid-April, is fitted with electric winches and windlass. The weight of non-ferrous metals in the oil motor compared with the steam engine is much less, the condenser alone being responsible for a large proportion of copper and brass in the tubes, tube plates and connecting pipes; the cranks, crossheads and main bearings are lighter in the oil motor as to the brasses, but are more in number; the eccentrics and valve gear of the steam engine require several cwts. of brass not wanted in the oil motor. It is an interesting problem to work out all the details and make a close analysis of the more costly metals in the steam and oil engine. There is a great variation in the weights of copper and brass in the former between different makers, but less so now than formerly, due to keener competition and restriction in overall cost, and the requirements of the particular trade the vessels are designed for. There is less variation in respect to these metals in the oil engine. The motor-boat race in the Mediterranean was won by the French vessel *Mais je vais piquer* on an average speed of about 57 kilometres over a course of 200 kilometres. The formation of two companies, during the last few weeks, for the manufacture in Britain of large oil engines, has brought prominently before the public the coming of the motor vessel, and the lessons and experience gained by continental builders is now more readily available for general use. The coasting vessels in course of building for the West of Scotland are excellent types to show results, which doubtless will prove gratifying to the owners. Messrs. Douglas Primrose & Co., Glasgow, are congratulated on obtaining the contract for the first of these vessels, being fitted with the Bolinders, for which this firm are the agents. The dimensions of the largest craft are:—142 ft. long, with 25 ft. 6 in. beam, and on a draught of 10 ft. 3 in. will carry 480 tons. Since writing these notes we are informed that it is intended to lengthen the hull of the vessel by about 7 ft. The engines are of four-cylinder type, developing 480 I.H.P., to give a speed of 9 knots to the laden vessel. An oil-fired donkey-boiler is being fitted for driving two steam winches, steam capstan and steering gear. This vessel was originally designed for steam engines, and had she been so fitted the carrying capacity would have been 420 tons, so that even although not specially designed for oil engines, there is still a clear gain of 60 tons in the cargo department. The introduction of the Bolinders engine has been followed by a large number of orders for this type of engine, which in this particular case is described as a semi-Diesel

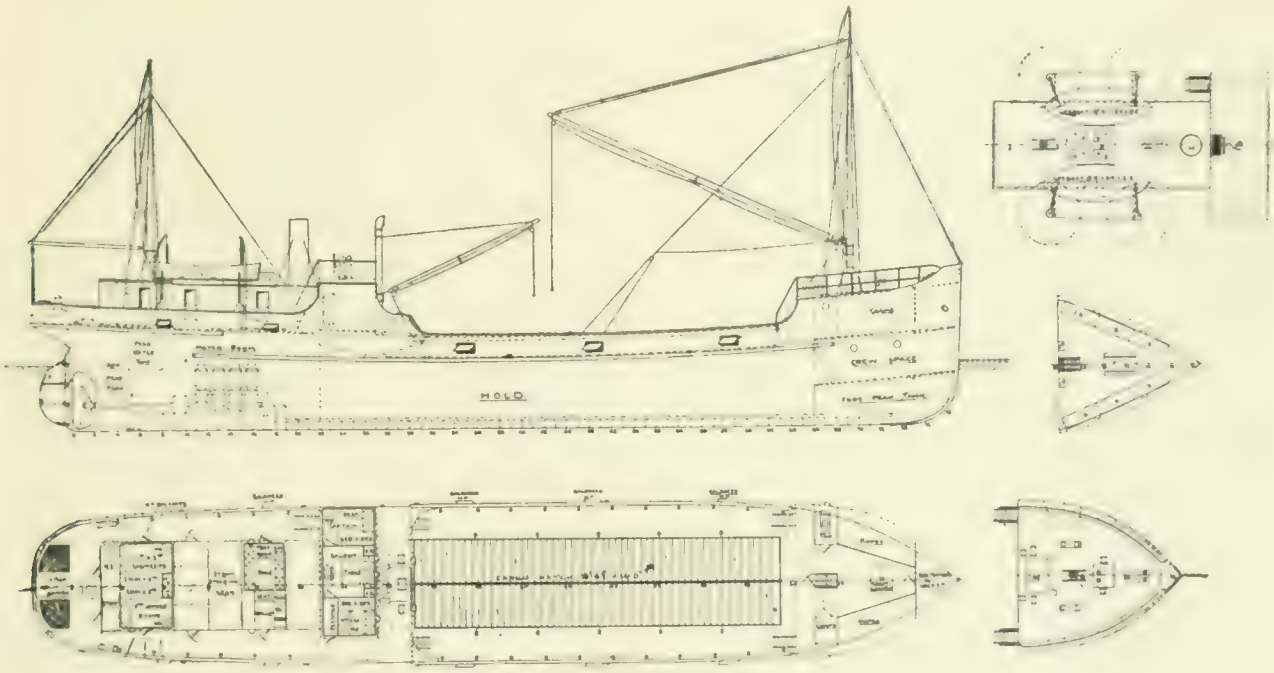
two stroke and direct reversible. The works in Sweden are fully occupied to their limit in coping with orders in hand.

The orders for oil motor vessels which are placed, or on the eve of being placed, are somewhat numerous this month, and include those for the Hamburg Petroleum Company to be built by Messrs. Krupp. These vessels are for carrying petroleum, and are to be from 400 to 520 ft. long and fitted with twin-engines of the two-cycle type, each set with six cylinders designed to give a speed of 9 to 10½ knots. The vessel on hand by Messrs. Richardsons, Westgarth for the Furness Line will probably be ready for service in the course of the autumn and will be followed by others when experience has justified the departure made from steam. The Bolinders engine is making considerable headway, as, in addition to the orders through the Glasgow agents, Messrs. Pollock, London, have received orders for two more tug boats. The *Wren*, illustrated in our March issue, has been cruising around Continental waters, and the reliability and handiness of her machinery has been quite up to the mark of success which was claimed on her trials from the Clyde to the Thames. Several references have been made in connection with the sad loss of the *Titanic* to the desirability of having motor boats supplied to large passenger ships, so that they could be utilized, not only for life-saving, but for towing the boats. The statement that some of those who were at the oars in the boats had their hands frost-bitten and were almost incapable of rowing, emphasizes the suggestion. The arrangement is certainly preferable to the usual steam launch, and indeed has been accepted in some cases. The large number of pleasure boats and yachts now in service all round the coast serve to show to shipowners and their representatives so many varieties and types of craft, machinery and fittings that they can readily find a choice to suit their requirements. The Wolseley Motor Company seems to succeed at the Monaco motor boat races. The *Lysaer*, the Duke of Westminster's racing craft fitted by this firm, having gained the prize for speed in the round run in the navigability prize.

The s.s. "Rosmo" launched recently by Messrs. Austin and Son has been supplied with a Cochran Ainsworth donkey boiler fitted with patent seamless furnaces.

CLYDE-BUILT DREDGERS.

CLYDE-BUILT dredgers are to be found doing cyclopean work in almost all parts of the world where the estuaries or deltas of great rivers constitute physical features, while dredgers of the lighter and pioneer type, both of Clyde and other build, are quietly and insidiously at work at the head streams and along its borders of unexplored and unknown water courses. One Clyde firm alone, who specialize in dredgers of the heavier type, have sent nearly twenty dredgers to Durban on the East Coast of Africa, which have achieved stupendous work in harbour development. At Bombay two dredgers built by the firm in question—Messrs. Wm. Simons and Co., Ltd., Renfrew—are at work in the carrying out of a gigantic reclamation scheme. The area being reclaimed from the sea is about 600 acres.



Steel Oil Engine Coasting Vessel.
Contract obtained by Messrs. Douglas, Primrose & Co., Glasgow (*see Marine Motor Notes*).

Each vessel, being of the cutter and pump suction type, can draw up through its suction tube from the sea-bed 2,700 tons of spoil per hour, and force that material through the floating pipe 4,500 ft. in length to the shore-edge. An even more powerful dredger of the same class was sent out by the same Renfrew firm last month to Buenos Ayres, which is capable of raising and discharging 5,000 tons of material per hour, a previous vessel in that region, which was sent out some time ago, having already dredged and discharged 49,000 tons of clay in the Punto del Indio, River Plate. One of the latest leviathans of the dredger class built and equipped for colossal work by Messrs. Simons & Co. is the bucket dredger *Conrad*, which in spite of enormous competition and jealousy on the part of American shipbuilders and financiers was entrusted to the Renfrew firm. This huge

dredging craft arrived safely at Panama on March 27th and in this region she will be employed in the deepening of the entrance to that mammoth canal, the opening of which will have such immense influence on the shipping of almost the whole world. To say the least it is a tribute to Clyde shipbuilding and engineering skill that a Renfrew-built dredger should be called into service on the Panama Canal contract—a United States undertaking carried out by American engineers. This Panama Canal ship has bucket-dredging gear of the most massive description for the heaviest under-water labour; and the ladder with its steel buckets, links and pins, weighs 240 tons. The ladder reaches down 50 ft. under the sea, and the ship's hopper can hold 1,200 tons of dredgings.

REVIEWS.

Glasgow Shipping: Who's Who, 1912. Liverpool: "Journal of Commerce" Offices. Price 1/-.

THIS is a new annual and forms a companion volume to "Liverpool Shipping" and "London Shipping," issued by the same publishers. It is expected that the book will become of service, not only to the shipping community of Glasgow, but to all having business relationship with the shipping trade of the port. The volume is a complete directory, personal and official, to the shipping and allied trades in the Port of Glasgow, including Greenock and Port Glasgow. Being published at a low price, nicely printed and containing useful information, the little book will no doubt enjoy a considerable popularity.

The Fleet Annual and Naval Year Book, 1912. Compiled by Lionel Yexley. London: The Fleet, Ltd., 414a, Harrow Road. 1/- nett; cloth boards, 2/6 nett.

THIS useful little annual is now in its seventh year, and, published at a popular price, brings before its readers a great deal of information only to be found in the higher-priced annuals; though necessarily the information is not so extensive. The volume is divided in two parts:—Part I. containing several articles, among which may be found "The application of 'Monitor' corrugated sides in the design of warships"; an illustrated description of the Elswick works of Sir W. G. Armstrong, Whitworth & Co., Ltd., and Mr. Yexley contributes an article on his old subject, "Naval Unrest, its Cause and Cure," the cure being chiefly concerned with pay and promotion. Part II. contains the Navies of the World, and gives a review of the year's events, with lists of the warships of the different countries. A useful feature of the volume is a description of the distinguishing bands on funnels of H.M. ships, which, we believe, cannot be found in any other publication. There are several illustrations in the book.

Directory of Shipowners, Shipbuilders and Marine Engineers, 1912. London: The Directory Publishing Co., Ltd. By subscription 5/-; after publication, 10/-.

THE information in the 1912 edition of this directory, which is in its tenth year of publication, is of a useful and comprehensive nature, and the volume is arranged so that its information is easily accessible. The directory has been mostly compiled from official sources, and every care taken to bring the contents up to date and accurate, though it is not claimed that the book is absolutely correct. The early pages of the volume contain an alphabetical list of the shipping Companies and an index to the Companies in order of towns. The composition is shown of the British Admiralty, Board of Trade, Lloyd's Register, British Corporation, Bureau Veritas, the Salvage Associations and chief underwriters. The lists of shipowners, shipbuilders and marine engineers take up the bulk of the volume, and give a great deal of information relating to each firm. Boat and personal indices close a very useful publication.

Macdonald's English Directory and Gazetteer, 1912. In two volumes, twenty-sixth year. Edinburgh: Messrs. Wm. Macdonald & Co., Ltd. Subscription price 30/-; after publication, 50/-.

THIS comprehensive publication is the largest directory in the English language, and it is claimed to contain the names and addresses of more manufacturers, merchants, traders, etc., than any other directory. It is a truly stupendous work. It includes copious lists of the professions, trades and businesses of all the cities, towns and counties of England, Wales, Isle of Man and Channel Islands, every name considered of sufficient importance for a wholesale house to solicit custom from being entered. The work is arranged as follows:—Vol. I. consists of a Trades Directory of London and over 300 suburban districts, followed by the principal provincial cities and towns in alphabetical order. Vol. II. contains a trade directory dealing with those towns not included in Vol. I., and also takes in all villages of importance in England and Wales; these are grouped alphabetically under their counties and the counties are also arranged alphabetically to facilitate reference. It is obvious that to get the same amount of information elsewhere would necessitate a heavy expenditure on a number of local and county directories, but here we have it in a concise form and easily accessible. The work also contains a gazetteer of England and Wales giving the location, population and other local statistics and historical references. The town plans form an important feature of the work. The publishers are to be congratulated on the issue of the volumes, which have grown to their present huge proportions by gradual stages, and at the same time acquiring a name for completeness and accuracy.

Ice and Cold Storage Trades Directory for 1912. London: The Ice and Cold Storage Publishing Co., Ltd. Price 5/-.

THE twelfth issue of this directory for the various interests in connection with the ice-making, artificial refrigeration and cold storage industries, has been thoroughly revised for 1912, and many new names added. The very complete list of vessels herein contained fitted with refrigerating machinery is now looked upon as authoritative, and is much referred to. Amongst other additions to the present volume, which it is intended to make permanent features, will be found details of steam trawlers fitted with refrigerating machinery and registered at Lloyd's. The volume also contains tables of temperatures, properties and capacities.

Sell's Telegraphic Addresses, 1912. London: Henry Sell. Price 25/-.

FOR twenty-seven years Sell's Directory has steadily grown, until now it occupies a first place as a standard general directory of the United Kingdom. It is a business directory of every town and for every trade. The firms grouped under 3,000 various trades are located all over the Kingdom, and include the chief firms in every branch of business. The present volume shows a great increase in the number of telegraphic addresses registered during the past year, and it will be seen from the Revenue returns issued for the nine months ending December 31st, there is an increase over the corresponding period of £55,000 in telegraph business done, facts which confirm the continued popularity of the telegram as a means of communication between business houses. Sell's Directory will be found invaluable as giving the telephone numbers and telegraphic addresses in one volume. With this book in the office a firm may obtain the telephone number of practically every important firm in the United Kingdom without waste of time. Interesting articles on the Post Office and on Business Prospects in 1912 are included, and the whole volume does credit to the well known house from which it emanates.

Merchants, Manufacturers and Shippers of the World, 1912. London: Kelly's Directories, Ltd.

THE 1912 edition of this directory has just been issued by Messrs. Kelly's, Ltd. The volume is, of course, intended for the use of merchants all over the world, and the headings throughout are given in English and French, and, further, in the commercial language of the country to which any par-

ticular section refers. The information given relates to little short of 20,000 foreign and colonial cities and towns, and there are nearly 1,250,000 trade classifications given under them. The indices give some 150,000 references and are so complete that by the use of the first index the pages relating to any individual place can be ascertained in a moment, and by the use of the "Index to Trades" a merchant carrying on any particular trade in any particular place can be found with equal facility. The directory cannot fail to be of great value to those anxious to increase or extend their foreign trade, as the book is a reliable guide to both the import and export trades of the world, and much information is given in it which is not to be found in any other directory. The regulations in force with reference to commercial travellers and their samples are fully set out at the commencement of the work. The volume contains 3,250 closely-printed pages and is strongly bound in cloth boards.

Diesel Engines for Land and Marine Work. By A. P. Chalkley. London: Constable & Co., Ltd. 1912.

We have had one revolution follow another in marine work, and it appears that in the Diesel engine another epoch is to be entered upon. The system has been tried in various ways and powers of 6,000 h.p. are said to be in construction now, so that we are dealing with no small matter. For all the intermediate stages that have been passed through and which are noticed here we may ask what is the basis worked upon, what are the fundamental principles exemplified, and in answering this question the inventor has set himself to put in practice quite new ideas. As is well known oil is the medium employed, but it is in a novel form. Air alone is first acted upon in this engine and compressed before the fuel is introduced at all, and as an effect much less fuel is required per unit of power. The air has to be stored and be ready for use, carried in bottles, as it is said. This, therefore, is an innovation. By the mixture of proper proportion of compressed air and a spray of fuel the power is obtained. While the efficiency of the best steam engines is given as 15 to 10 per cent. the figure for the Diesel engine is put down as 34 to 32 per cent., and the author says a Diesel engine is an internal combustion engine, while all other gas and oil engines are internal explosion ones. The indicator diagrams from these engines show up remarkably well. Most of them have been built vertically, but there are also horizontal ones in existence, and double-acting as well as single. The latter predominate, however, and most firms make them of the trunk type. A remarkable feature is that any kind of oil may be employed, *i.e.*, the crude or residual oils.

Vessels are running driven by the new power and it is possible to reduce the speed down by the lesser quantity of fuel employed, though mention is made in some cases of gearing for this purpose. There are as many as 300 vessels with installations and some are submarines, and the weight of fuel is said to be only one fifth of that required by a steamship, showing the saving effected in this direction. Against the system is the expense of manufacture. This is a delicate machine, but it has otherwise all the capabilities of a steam engine. It can be reversed easily, for example, and the diagrams shown give the engine as not unlike what we are accustomed to in steam. The oil employed is of the heavy bodied high flash type. There is no danger with it, therefore, in any way. From the little we have said it will be seen that for marine work we have here a great competitor, and all who are interested will find in this volume drawings and every information of a simple character that will thoroughly commend itself. The author knows his subject and is quite at home with all the problems of marine work design. He is enabled, therefore, to give the for and against at each step he takes. There are quite a large number of examples of engines shown that have been fitted in vessels and the text of detail are clear and concise throughout.

BATTLESHIP CRUISER "LION." The Publishers have a few photogravure prints of this battleship left. Price 1/: signed artist proofs 1/9 each, post free.

MESSRS. WALLS DUFFY & CO. LTD. have recently issued a booklet giving the latest information on their "Enamastic" solutions and enamels. Illustrations of works and structures coated with the Company's solutions and enamels are shown and a number of testimonials are included.

OBITUARY.

John C. Bull.

WE have to place on record with regret which will be shared in by very many in shipping and marine engineering circles in this country and abroad the death of Mr. John C. Bull, managing director of Messrs. Bull's Metal and Melloid Co., Ltd., Yoker on Clyde. The event took place on 6th April at Christiania, Norway, where he had gone early in March in the hope of recuperating after a somewhat prolonged illness. Deceased was born at Tönsberg, Norway, on November 15th, 1857, and was thus in his fifty-second year. He received his education, mostly of a scientific character, at the University of Christiania and came to this country in 1884. Chemistry and metallurgy formed favourite studies and his first situation in England was with Messrs. Alexander Dick & Co., founders of the Delta Metal Co. In 1888 Mr. Bull invented and patented the alloy which subsequently became well known—especially in marine engineering—as "Bull's Metal." For a time he was employed at the works of Messrs. Maxim Nordenfelt and Co. (now Messrs. Vickers & Co.) and of Messrs. Easton and Anderson, Erith, and in 1890 he joined the Phosphor Bronze Co. Ltd., with whom he was associated for about eight years. This connection was terminated in 1898 when Mr. Bull left to form Messrs. Bull's Metal and Melloid Co., which at first had offices and small works in London. With the growth in demand for Bull's Metal and other specialities patented by Mr. Bull, it was found necessary to establish works on a larger scale, and in a district nearer the area of demand. In 1901-2 the present works at Yoker were laid down. These, however, having been increasingly taxed to overtake the business offering, have within the past one-and-a-half years been extended to nearly double their original capacity and output. Screw propellers, both of the solid and "built" type, of Bull's Metal have been adopted by very many of the largest merchant shipping companies, with distinct advantage as regards economy of coal and diminished cost of upkeep. Besides bearing-metals of various kinds, the Company also manufactured bronze rods up to 6-in. diameter, the rolling mill department for this being the only one of its kind in Scotland. Mr. Bull was a member of the Institute of Marine Engineers and of the North East Coast Institution of Engineers and Shipbuilders. His loss is mourned by a widow and family of two sons and four daughters.

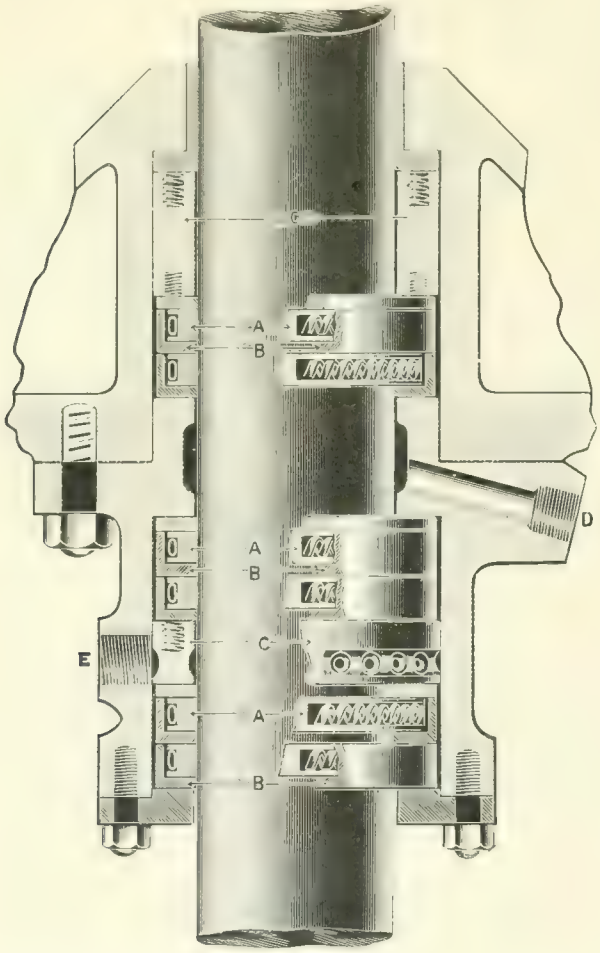
THE P. & O. COMPANY. Mr. J. B. Hodgson is retiring after fifty years spent in the P. & O. service at home and abroad. During later years he was the manager of the import freight department. A farewell dinner was given to him recently at the Holborn Restaurant.

MR. J. T. MILTON, the Chief Engineer Surveyor of Lloyd's Register of British and Foreign Shipping, has been elected President of the Cold Storage and Ice Association for the year ending March 25th, 1913. The thirteenth anniversary dinner of the Cold Storage and Ice Association will be held at the Hotel Cecil on Monday, May 13th, 1912, when the guests of the evening will include Sir Richard Solomon, K.C.B., K.C.M.G., the High Commissioner for the Union of South Africa, and Sir J. Alfred Ewing, K.C.B., Director of Naval Education.

IRON AND STEEL INSTITUTE. The annual meeting of this Institute will be held by kind permission, at the Institution of Civil Engineers, Great George Street, Westminster, on Thursday and Friday, the 9th and 10th of May. The Council's report and the statement of accounts will be presented. Officers will be appointed, and the retiring president, the Duke of Devonshire, will induct into the chair the president-elect, Mr. Arthur Cooper. The Bessemer gold medal for 1911 will be presented to Mr. J. H. Darby. The Andrew Carnegie gold medal for 1911 will be presented to Dr. P. Gerard Akeroyd. A number of papers will be read, among which may be mentioned: "Chemical and mechanical properties of iron, vanadium and carbon," by Dr. Arnold and Prof. Read; "The influence of carbon on corrosion," by Mr. C. Chappell; "The mechanism of corrosion," by Dr. Friend and Messrs. West and Lloyd; "Modern rolling mill practice," by Mr. Hall; "The influence of heat on hardened tool steel," by Mr. Herbert. The annual dinner will be held on the 9th of May at the Connaught Rooms, Great Queen Street.

BELDAM PACKING.

IN the adjoining illustration is shown the method of fitting the Patent "Excelsior" Metallic Rings made by the Beldam Packing and Rubber Co., 93, Gracechurch Street, London, E.C., who are the sole patentees and manufacturers of this and other patent types of metallic packing. The particular type illustrated is known as the "Duplex" type, and is designed specially to meet the high standard of present-day requirements in connection with high steam pressures. The "Duplex" type is claimed to be the ideal packing for the reciprocating turbine engines. The following is a brief *résumé* of the



Beldam Packing

main principles. There is a gradual reduction of the pressure throughout the gland by the method of counterbalancing by the pressure of the receivers. The rings are maintained in partial equilibrium, thereby preventing any undue wear, and the rod being subjected to a minimum of friction the efficiency of the engine is greatly increased. Each ring works independently of the other, and all the rings are interchangeable and self-adjusting. Referring to the illustration, A A A are the "Excelsior" metallic rings, which are contained in the floating container box B, maintained in place by the spring loaded distance piece C, while the communicating passage D is connected to the I.P. receiver, and the passage E to the L.P. receiver.

As mentioned above, the Beldam Packing and Rubber Co. are also patentees and manufacturers of other well-known engineering specialities, such as "Pilot" and other brands of packings and jointings, corrugated metallic valves for air and circulating pumps, and the "Reliable" tube stopper. In addition to an extensive business among the leading steamship companies, Messrs. Beldam are contractors to the British and foreign navies, and have been awarded gold medals at Milan International Exhibition, 1906, Franco-British Exhibition, 1908, and Japan-British Exhibition, 1910.

Among the numerous steamers now fitted and running successfully with the Beldam Co.'s "Duplex" type of packing may be mentioned the following :—

Zealandic	White Star Line
Megantic	,, ,,
Laurentic	,, ,,
Minneapolis.....	Atlantic Transport Line
Minnewaska	,, ,, ,,
Minnetonka	,, ,, ,,
Vandyck	Lamport & Holt
Meltonian	Leyland Line
Ninian	,, ,,
Pakeha	Shaw, Savill & Albion, Ltd.
Mamari	,, ,, ,, ,,
Whakarua	Tyser Line
Demosthenes	Geo. Thompson & Co.
Remuera	New Zealand Shipping Co., Ltd.
Hurunui	,, ,, ,, ,,
Lapland	Red Star Line

and in addition there are being fitted—new steamers for the New Zealand Shipping Co., Ltd., the White Star Line, and the Leyland Line.

FRENCH LINER "LA FRANCE."

THIS liner, which left Havre for New York on the 20th April on her maiden trip, is not only the largest and speediest boat under the French flag, but her accommodation will exceed in luxury all other steamers on the same route. Both engines and hull have been built by the "Chantiers de l'Atlantique," the famous French yard, and the vessel is owned by Cie. Générale Transatlantique. She is the first French liner driven by four propellers actuated by Parsons turbines, aggregating 45,000 s.h.p. These turbines are the largest ever built in a French shop. Her keel was laid down on the 20th April, 1909, she became water borne on the 20th September, 1910, and left St. Nazaire for trials on the 3rd April last. The main particulars of the vessel are as follows:—Length over all, 715 ft. 3 ins.; length between perpendiculars, 665 ft. 2 ins.; breadth, 75 ft. 3 in.; depth from "A" deck, 78 ft. 9 ins.; depth from main deck "D," 52 ft. 10 ins.; draught loaded, 27 ft. 6 ins.; displacement, 28,000 tons; gross tonnage, 23,000; speed, 23·5 (a speed of 25½ knots has been maintained on trials). She has eight decks, six of which are devoted to passengers. The total number of persons carried is 2,650, made up as follows: 550 1st-class passengers, 450 2nd-class, 250 3rd-class, 800 steerage, crew 600.

La France.

THE ROTO-PLUNGE PUMP.

IN our issue of last August we gave an illustrated description of the new Roto-plunge Pump, and since then the matter has gone through some considerable development. We illustrate, in the adjoining diagram, a pump which has been installed at the Mount Stuart Dry Dock, Cardiff. This pump has discharge of 9 inches diameter, and is driven by a steam engine having a cylinder 8 inches diameter and 12 inches stroke, and runs at 220 revolutions per minute with a steam pressure of 65 lbs. per square inch. The discharge through a total over-all lift of 37 feet, with no allowance for friction, was 1,045 gallons per minute, while the suction depth was 30 feet, and the vacuum on the pump was 29·75 inches when the barometer was standing at 29·95 inches. At a subsequent test, during last month, an actual vertical depth of suction of 30 feet 6 inches was obtained when the vacuum on the suction was 29 inches and the barometer stood at 29·15 inches.

A Roto-plunge Pump installed at the Mount Stuart Dry Dock, Cardiff.

INSTITUTION OF ENGINEERS AND SHIPBUILDERS IN SCOTLAND.—On 23rd April, Mr. D. M. Shannon read a paper before the Institution on "Some aspects of Diesel Engine Design."

HEAVY OIL ENGINES.—Captain H. R. Sankey, R.E., M.I.C.E., gave the first of four lectures on "Heavy Oil Engines" on the 29th April. The dates for the other three lectures are May 6th, 13th and 20th, at the Royal Society of Arts, John Street, Adelphi.

INSTITUTE OF MARINE ENGINEERS.—The proposed syllabus (subject to additions and alterations) has just been issued by the Institute. May 18th.—Visit to the works of the Western Electric Co., Ltd., Silvertown, at 3 p.m. June 22nd.—Visit to the Exhibition of Non-Ferrous Metals, Agricultural Hall. June 29th.—Visit to the William Froude Experimental Tank, National Physical Laboratory, Teddington. July 20th.—Visit to the General Post Office, Circulation Department and Instrument Galleries. The annual dinner will be held on the 8th November at the Connaught Rooms, Kingsway.

Industrial and Trade Notes.

THE CLYDE AND SCOTLAND.

(*From our Own Correspondent*)

Fresh Naval Contracts.—With the beginning of April the news which has been communicated during March as to the placing of fresh and highly important naval work with Messrs. John Brown & Co., Clydebank, was further enhanced in gratifying interest for Clyde shipbuilders and artizans by the announcement that of the Admiralty's order for sixteen of the twenty destroyers included in this year's shipbuilding programme as many as eight of the vessels—one half the number—had been placed with Clydeside firms. The Fairfield Co., Govan, have been commissioned to build and engine four of the vessels, Messrs. Yarrow & Co., Scotstoun, two, and Messrs. William Denny & Bros., Dumbarton, two. As regards the provision of turbine and other machinery for the vessels, it is possible that in the case of the firm last named the importance of the commission may be added to by their being requisitioned by Messrs. Parsons' Marine Steam Turbine Co., of Wallsend-on-Tyne, to build the hulls for the two vessels of the lot which they have been commissioned to supply.

Messrs. Yarrow & Co., Ltd., Scotstoun, who have shared in the new orders as stated above, have been prominently in evidence since April set in as builders of destroyers and other special naval craft, a matter perhaps which is not of outstanding interest when the reputation of the firm in such lines of work is remembered. At the end of March the firm subjected to her full speed trials H.M.S. *Attack*, one of the special destroyers with superheaters which they have on hand for the British Admiralty. On the Skelmorlie deep-water measured mile this vessel attained a mean speed, during a continuous run of eight hours, of 30·6 knots, thus exceeding the contract speed of 28 knots by 2·6 knots—a striking result. The vessel is 240 ft. long by 25 ft. 7 in. beam and is propelled by Brown-Curtis turbines driving twin screws. Steam is supplied by three Yarrow water-tube boilers fitted with the firm's most recent superheating and feed-heating appliances. On April 9th the firm launched the fast ocean-going destroyer *Firedrake*, which is the first of three similar destroyers of special design for the British Admiralty. These are to have a speed of 30 knots, being 255 ft. in length by 25 ft. 7 in. beam. The propelling machinery consists of Parsons turbines driving two shafts, steam being supplied by three Yarrow water-tube boilers fitted for burning oil fuel only. Messrs. Yarrow & Co. have just been paid a decided compliment by the Navy Department at Washington, who have contracted with them for the supply of designs for shallow-draught gunboats which the United States intend to place on the China rivers, and the actual construction of which from Messrs. Yarrow's designs and instructions, will be carried out in the States. This action on the part of the United States Navy Department is understood to be due to the exceptional success of H.M. shallow-draught gunboat *Widgeon*, which has made some remarkable runs on the Yang-tse-Kiang.

Messrs. The Fairfield Shipbuilding Co., Govan, whose share in the distribution of destroyer orders above noted, is greater than that of any other firm on the Clyde or elsewhere, launched on March 30th H.M.S. *Endeavour*, which has been specially designed and built for the work of surveying the navigable waters of the world, and is the first vessel specially commissioned for this purpose by the Admiralty. She is a vessel of 1,300 tons displacement and 13 knots speed, is propelled by twin screws, each driven by a set of triple-expansion engines, and is distinguished by other notable features which cannot here be enumerated. The geared turbine channel steamer *Hantonia*, the second of two vessels—the first being the *Normannia*, handed over some time ago—built by the Fairfield Company for the Southampton to Havre service of the London and South-Western Railway Co., was tried for speed about the end of March, and was shortly thereafter handed over and put into service. The results obtained by the two vessels on their official trials were extremely satisfactory and have proved that the geared turbine is another step forward in the method of propelling steamers. The *Hantonia* attained, on the measured mile off Skelmorlie, a speed of 20¼ knots, which is considerably more than the Fairfield Co. guaranteed.

Messrs. William Denny & Brothers, Dumbarton, who also share in the batch of new destroyer orders, have since the beginning of April been to the front, as usual, with high-speed river and channel steamers. On April 10th they launched the turbine steamer *Queen Alexandra*, which has been constructed for service on the Firth of Clyde to the order of the Clyde Turbine Steamers, Ltd.. The new vessel differs in details only from her predecessor of the same name, which proved so popular on the Campbeltown route and is now in service at Vancouver under the name of *Princess Patricia*. The propelling machinery of the new vessel consists of three sets of Parsons turbines (by Messrs. Denny & Co.), each driving a separate propeller. This machinery has more reversing power than in her predecessor, and the vessel is fitted with a rudder at the bow as well as the stern, so that she will be much more easily manœuvred at piers, etc., than the earlier turbine steamers—a matter which Mr. James Denny acknowledges admitted of some improvement. On April 16th, the *Princess Victoria*, built by Messrs. Denny, for the Larne and Stranraer Joint Railways, ran trials on the Clyde measured mile and attained a speed of 21 knots—one knot in excess of contract requirements. The vessel is a sister ship to the *Princess Maud*, which was built by the same firm in 1904. The dimensions are 300 ft. length, 40 ft. breadth and 24 ft. 6 in. depth to promenade deck. The new vessel is intended primarily for the mail and passenger service, but accommodation is also provided for a limited amount of cargo, a special feature of this department being the arrangements made for the carriage of motor cars.

Messrs. Harland & Wolff, Ltd., who, since their absorption of the shipbuilding and engineering works of the London and Glasgow Shipbuilding and Engineering Co., Ltd., Govan, as briefly chronicled in last month's notes, have now to be reckoned with as a Clyde concern, as well as still holding the lead at Belfast and spreading their wings at Southampton and on the Mersey, are making a number of alterations of working the old-established Govan establishment. A large quantity of new machinery has already been introduced and it is proposed to effect many other improvements before long. Great extensions and improvements have, of course, been carried out of late both to the shipyard at Govan and the engineering shops at Lancefield on the opposite side of the river, while a large fitting-out basin has been constructed on the site of what once was the shipyard of Robert Napier and Sons, where so many notable steamships, both for naval and mercantile needs, were built. It is understood that the new passenger steamer of the "Ailanza" type, which the Royal Mail Steam Packet Co. have recently ordered from Messrs. Harland & Wolff, is to be laid down on a vacant berth in the Govan yard. It will be the largest steamer ever constructed on the upper reaches of the Clyde, and curiously enough its being laid down on this particular berth will be like taking up the thread of an old story. In the yard of Messrs. Robert Napier & Sons many Royal Mail Steam Packet Co.'s steamers were built of old, including the *Atrato*, the *Clyde*, the *Magdalena*, the *Tagus*, the *Trent*, the *Thames* and the *Tyne*, although none of these were as big or so luxuriously fitted for passengers as the steamer now about to be laid down. Giant merchant vessels, however, will still continue to be the staple product of the Belfast yard of this great firm, and the adoption of the Clyde establishment is believed to be a clear bid for a worthy share in the naval work offering, when handiness to the sources of building material, armament and outfitting facilities, are factors to conjure with.

New Mercantile Tonnage Ordered.—Work in the shipyards and engineering shops of the Clyde and other Scottish centres has proceeded with surprising pace and regularity considering the general industrial situation as regards supplies of coal and manufactured material, but there has been more interruption to progress due to uncertain delivery of material through railway dislocation than to absolute want of coal. Happily matters, so far as the future supply of coal is concerned, are now in a comparatively satisfactory condition, but the fears of prospective dearth and absolute stoppage of supply have had the effect of discouraging and shutting off prospective business in new tonnage orders. This, of course, has been contributed to by the fact that builders and engineers are alike very satisfactorily placed as regards work actually

[illegible] the contracts booked since last month's notes were penned, both on the Clyde and in the south of the East Coast of Scotland. Messrs. Barclay, Curle & Co., Ltd., Whiteinch, and Dennys, Dumbarton, [illegible] the [illegible] the [illegible] [illegible] about 6,000 tons for the East Asiatic Co., of Copenhagen. Messrs. Marshall & Nicholson, Govan, [illegible] engines by Messrs. Muir & Houston, Kinning Park, Glasgow. Messrs. Murdoch & Murray, Port Glasgow, [illegible] deadweight for Manchester own[illegible] has [illegible]. Messrs. John Cran & Co., Leith, a twin-screw tug steamer for the Swansea Harbour Trust. Messrs. the Dundee Shipbuilding Co., Dundee, [illegible] engines by Messrs. Hall, Russell & Co., Aberdeen, two interesting steamers for West of Scotland owners. [illegible] that the hospital ship which is required for the British Navy will be built by Messrs. Workman, Clark & Co., Ltd., Belfast.

TYNESIDE AND WEARSIDE.

(From our Own Correspondent.)

Tyneside.

Work continues to be plentiful at all the shipyards and engineering works on both sides of the river, and now that the coal trade has settled business will soon be in full swing when coal can be secured. It is to be hoped that trade will not be hampered by any more strikes, as the district, as has been mentioned, but that the agreement come to by all sections of the shipyard workers as to the demarcation of work to be done by each trade will hold good so that all the yards can go on without any friction among the different workers.

Messrs. Sir W. Armstrong, Whitworth & Co., Ltd., are still busy in all departments, and amongst other vessels are building the Brazilian battleship *Rio* and the Chilian battleship *Valparaiso*, the largest battleship they have ever undertaken to build. The excavation work at their new Walker yard is being rapidly proceeded with, and it is expected that a battleship will be laid down there in a short time. The old Walker yard is full of work and amongst other vessels building there are three of the largest tank steamers yet designed, these being for Messrs. Pearson & Co.

Messrs. Palmers' Shipbuilding & Iron Co., Ltd., have plenty of work on hand and have booked quite a number of orders since the Parsons Turbine Co. for the construction of the hulls of their speed boat destroyers, given to the Palmers Co. by the British Admiralty. Work on the battleship *Orion* *Mars* continues apace and everything is going on satisfactorily. The *Bellerophon* is in their dry dock.

Smith's Dock Co., Ltd., are very busy and have numerous on hand, being repairs of vessels, both on the slipways and alongside the quay.

Messrs. Brigham & Cowan have several vessels under repair.

Wearside.

Work continues to be brisk at all the shipyards and engineering works on the river, and everything points to a good year if there are no labour troubles.

Messrs. Wm. Doxford & Sons, Ltd., are very busy with a number of vessels in various stages of repair, and on the engine work are building part of three engines for steamers.

Messrs. S. P. Austin & Son, Ltd., [illegible] made [illegible] of work, [illegible] survey. The new steamer [illegible] for the Oceanic and Cuba Mail Steamship Co., Ltd., [illegible] the yard, and it is expected that cargo will be provided for her very shortly. The steamer *Ivanoe*, being the sixth vessel built at this yard for the Polish Steamship Co., Ltd., at Newcastle and London, was launched on April 18th, and preparations will be made immediately for laying down a sister steamer of upward of [illegible] deadweight capacity on the vacated berth. Another vessel is being plated and the united work to a further vessel is in hand. There are three building berths at this yard and therefore work will be provided for some months to come.

Messrs. Osbourne, Graham & Co. have just delivered to the Hansa East Asiatic Co., Ltd., a steamer, the *Dania*, built for them and ordered through Messrs. Pile & Co., of London. The dimensions of the vessel are [illegible] ft. by [illegible] ft. by [illegible] ft. moulded, she is of the raised quarter deck type, with [illegible] and [illegible] ft. [illegible] in. The engines have been supplied by Messrs. Earle's Shipbuilding and Engineering Co., Ltd., of Hull, and are capable of giving the vessel a speed of [illegible] knots loaded. The s.s. *Marselis* is loading for the same [illegible] The vessel is a single screw steamer of the raised quarter deck type, with poop, bridge and forecastle, and her dimensions are [illegible] ft. by [illegible] ft. [illegible] in. Her deadweight is [illegible] tons and her draught [illegible] ft. She has been built to Mr. Bonnet, of Cadiz. Arrangements for the building of two steamers for Messrs. Fearnley & Eger, of Christiania, to be built on the Monitor patent principle, and which are similar in many respects to the patent Monitor steamers s.s. *Westerns* and *Hysteria*, owned by the Lensen Shipping Co., Ltd., of Newcastle. Amongst other work they have two more vessels for Mr. Fernando Bonet, of Cadiz, which are duplicate to the s.s.'s *Maria* and *Mercedes*, recently completed for the same owner. Fitting out at the Company's quay is the s.s. *Kitia No. [illegible]*, built for Messrs. The Union Steamship Co. of New Zealand Ltd. She is of the single deck type, with poop, bridge and forecastle; her dimensions are [illegible] ft. by [illegible] ft. by [illegible] ft. moulded, and she will carry about [illegible] tons on [illegible] ft. [illegible] in. draught. The engines have been supplied by Messrs. Geo. Clark, Ltd., and are designed to propel the vessel at a high speed.

Messrs. John Wigham & Son, South Hylton Works, Sunderland. This old established firm have recently designed and patented a steam-saving cut-off valve. This valve, which we understand is applicable to almost any make of the horizontal type of steam-steering gears, has met with considerable success, it appears, so much so that the firm have had to make considerable extensions to their already large works to cope with the demand. They have received many testimonials relating to the merits of the valve, an illustration of which appears in the advertisement pages of this issue.

THE TEES AND HARTLEPOOLS.

(From our Own Correspondent.)

Middlesbrough.

NEARLY all the blast furnaces are now working again, but owing to the recent coal strike, all the furnaces except one had to be blown out.

Messrs. Constantine & Pickering have recently had launched the cargo steamer s.s. *Wearwood*, of about 5,000 tons deadweight, built and engined at Sunderland.

Messrs. Sir Raylton Dixon & Co., Ltd., Cleveland Dockyard, are getting very busy again. They have had their joiners shop and moulding loft destroyed by fire, the damage being estimated at about [illegible] which is however covered by insurance.

Messrs. Smith's Dry Dock Co. have the s.s. *Cervona*, Montreal liner, in for heavy repairs, also the s.s. *Baron Ehrenfels*, of Liverpool, [illegible] other vessels dry-docking, etc.

Messrs. W. Harkess & Co. have [illegible] work on hand.

Messrs. Richardsons, Westgarth & Co. continue to be very busy. Besides the engines of work on hand, they are expected to have [illegible] the engines, and [illegible] ft. [illegible] boilers [illegible] [illegible] boilers.

The s.s. "Mickelas" is ashore at the Tees mouth, laden with iron ore, and has a large hole in her bows. She is being salved by Messrs. W. Loveridge & Co., of Seaton Carew.

Stockton and Thornaby.

Messrs. Craig, Taylor & Co. have now got busy again. Besides work on hand, they are reported to have secured an order to build a cargo steamer on the Isherwood principle.

Messrs. R. Ropner & Sons have plenty of work on hand.

Messrs. Richardson, Duck & Co. continue fairly busy, and expect to secure an order for a cargo steamer that is in the market for local owners.

Messrs. Blair & Co. have a large amount of work on hand. They are reported to have secured an order to supply the engine and boilers for a cargo steamer to be built locally.

West Hartlepool.

The s.s. *Lady Harness* and the s.s. *Lady Harness*, sold to Messrs. C. Ford & Co., will now be managed by them, as they have been transferred to Mr. J. P. Jonason, Landskrona, and renamed the s.s. *Grosveness* and s.s. *Grovelea*.

The s.s. *Sappa Ellison*, 2,285 gross tons, has been sold by Messrs. Allison & Hogg to Cie Navieri Bachi, of Bilbao, and renamed *Ramon*.

The s.s. *Thurston*, 1,863 gross tons, owned by J. E. Murrell and Son, has been sold to Aktieb Felicia, Gefle, Sweden, and renamed *Felicia*.

Messrs. W. Gray & Co. continue to be very busy. They have just booked the contract to build two 9,000-ton deadweight cargo steamers for the Netherlands S.S. Co., Amsterdam.

Messrs. Irvine's Shipbuilding and Dry Dock Co., Harbour Dockyard, are busy laying the keel for a steamer for local owners on the berth vacated by the s.s. *Blackhead*.

Hartlepool.

The Central Marine Engine Works of Messrs. W. Gray & Co. are very busy, having a large amount of work on hand. They are to engine the steamers previously mentioned as having been built by this firm.

Messrs. Irvine's Shipbuilding and Dry Dock Co., Middleton Yard, have secured the contract to build a cargo steamer of about 5,000 tons deadweight for Liverpool owners.

Messrs. Richardsons, Westgarth & Co., Ltd., continue to be very busy, and amongst the new orders are the engines and boilers for the steamers to be built at Messrs. Irvine and Co.'s Harbour and Middleton Yards. They also have a large amount of speciality work on hand, which includes complete sets of castings for two engines for steamers to be built at Trieste.

THE HUMBER AND DISTRICT.

(From our Own Correspondent.)

Hull and Barnsley Railway Company's Pier.—The pier on the Humber bank outside the company's dock, which they have constructed under their Act of 1907, is nearly completed. Now the company have entered into contracts for the erection of a warehouse upon the pier, and its equipment with electric cranes for the rapid discharging of cargoes, and loading of steamers at any state of the tide.

Hull Joint Dock.—This dock, the joint property of the Hull and Barnsley and the North-Eastern Railway Companies, is well advanced, and is promised to be opened for shipping in 1913. The existing docks are greatly congested, and the port feels the pinch greatly and will welcome the opening of the new dock, which will mean the development of the trade between Australia and Hull. A great number of large steamers are now discharging wool, etc., for the Bradford and district mills, and the port is fast coming to the front with Colonial merchants.

Humber Commercial Dock, Immingham, on the Lincolnshire side of the Humber, a few miles above Grimsby, belonging to the Great Central Railway Company, is approaching completion. The timber pond and graving dock are practically finished, and about 122 miles of permanent way have been laid, and the hydraulic plant is ready for use; the seven coal hoists on the South Quay wall are in readiness for coal shipment, and the requisite buildings and equipment generally are rapidly advancing towards the last stage of completion. It is rumoured that His Majesty the King will open the dock.

Lifeboat at Spurn. An agreement has been entered into between the Royal National Lifeboat Institution and the Humber Conservancy Board, under which the former has undertaken, since May 1st, 1911 the maintenance of the lifeboat establishment at Spurn, and the latter has agreed to make an additional annual contribution towards the cost.

Hull Trade with the Far East.—As giving some idea of the trade of this port with the Far East and the oil millers of Hull, with the Soya Beans, it may be mentioned that the following large steamers are now discharging their cargoes of beans in the Alexandra Docks, *viz.*: S.s. *Induna*, s.s. *India*, s.s. *Canton*, s.s. *Rioto* and s.s. *Persiana*, all from Vladivostock. The aggregate amount of the cargoes is nearly 40,000 tons.

Fatal Scalds.—A fatal explosion occurred on the Italian steamer *Pasquale P* in the Albert Dock on April 16th. The chief engineer was killed instantly and the second engineer succumbed to his injuries on the same evening in the Infirmary. Two other men were severely scalded. The explosion occurred through an attempt to plug a leaky tube in the main boiler. The men were hurled to the stokehold plates and scalded by the escaping steam and boiling water. The vessel belongs to Genoa, all the men being Italians.

Hull Coal Trade.—The miners' strike has had a disastrous effect upon this important branch of industry, hundreds of men directly engaged in the trade being thrown out of employment in consequence of the stoppage of the numerous coal shipping appliances around the docks, and other branches of trade have also suffered, and distress in some cases has been very acute, the employees having to work short time. At most of the large works and mills and other industrial concerns additional stocks of coal were procured previous to the strike, but these were being depleted owing to the unexpected continuance of the dispute, and employers deemed it advisable to work shorter hours and thus husband the resources of supply in hand. The following figures of the exports of coal will show at a glance the enormous loss to the port during the cessation of work at the collieries. For the week ending Tuesday, 19th March, the exports were 3,976 tons, while during the corresponding period of 1911, the total was 45,052 tons.

Week ending 26th March,	1912 (Tuesday).		935 tons.
Corresponding week ,,	1911	,,	58,527 ,,
Week ending 2nd April,	1912	,,	Nil.
Corresponding week ,,	1911	,,	60,474 ,,
Week ending 9th ,,	1912	,,	Nil.
Corresponding week ,,	1911	,,	80,454 ,,

The business done during the first quarter of the current year compared with 1911, is as follows:—Total entry *via* river, 11,944, rail, 293,384, March, 1912, total 305,328 tons; total entry March, 1911, 523,152 tons, decrease, 217,824 tons. Total entry current year, 1,344,224 tons; same period, 1911, 1,490,464 tons; decrease, 146,240 tons. Foreign export during current year, 519,715 tons; same period, 1911, 692,012 tons; decrease, 172,297 tons. London and coastwise shipments, current year, 234,416 tons; same period, 1911, 262,904 tons; decrease, 28,488 tons.

Messrs. Earle's Shipbuilding and Engineering Co., Ltd., are keeping busy with repair and new work, and are just completing the second order for the Great Central Railway Co.'s new ferry steamer, to run between Hull and New Holland piers in the Humber. The firm has just launched a new steamer, s.s. *Cattaro*, for the Baltic and Mediterranean trade (cargo only). She will be fully equipped with derricks and large steam winches for quick handling of cargoes. She is built to the British Corporation rules.

Messrs. the Hull Central Dry Dock and Engineering Co., Ltd.—This firm is fairly busy with dock work. Having abundance of coal during the miners' strike, they were in the happy position of being able to carry on work entrusted to them as usual.

Messrs. Amos & Smith, engineers and boilermakers, have been fortunate in securing an order for a few sets of new engines and boilers for steamers now building, and their branch shop at Alexandra Dock has been doing a fair amount of repair and graving dock work.

Messrs. Cooper & Co., engineers and boilermakers, are exceedingly busy with repair work, both on outside and local steamers; the firm's moulding and pattern shops are busy

with their own and outside orders. Orders have been secured for Cooper's patent propeller from British and Continental firms. Owing to pressure of work on occasions they have had to hire the public graving docks. The branch shop at Alexandra Dock has been and is fully engaged with repair work.

Messrs. C. D. Holmes & Co., Ltd., engineers and boilermakers are busy completing several trawlers ready for trial trips and all shops engine boiler moulding and pattern have plenty of work on hand.

The North-East Coast Engineering Works, Ltd., have been fairly busy with repair work on the s.s. *Knottingley*, general repairs, etc. Very extensive repairs have just been completed on the s.s. *Hessle* and s.s. *Emania*. The new branch shop at Goole is nearly completed and it is expected to obtain a fair amount of repair and other work at the Ouse port.

Messrs. Woodall & Co., engineers and boilermakers, have on hand a number of orders for their patent "Handiblocs" from British and foreign shippers. The outside staff has been engaged on several steamers and at the Corporation Tram Works; several enquiries for forgings have come in.

The Hull Forge Co. had to close down their works during the coal strike but have now re-opened. Several hundreds of men are employed by the Company.

Messrs. Cochrane & Sons, shipbuilders, Selby.—This firm launches a trawler every ten days or thereabout, and still the orders come in. They have sufficient work to keep their yard going all this year. The building of the machinery, etc., is generally placed in the capable hands of Messrs. Amos and Smith and Messrs. C. & D. Holmes, of Hull, where the trawlers are generally fitted out for sea.

SOUTH OF ENGLAND AND ISLE OF WIGHT.

(*From our Own Correspondent.*)

THE sailing of the *Titanic* on her first and last voyage was marked by a very strange occurrence. The *Titanic* had got safely out of her berth, and was nearly abreast the *Oceanic* and *New York*, the former being moored alongside the quay wall with the *New York* on the outside. Several sightseers were on the latter vessel witnessing the departure of the *Titanic*, and when she came abreast of the *New York*, found that they were moving, and that the *New York*'s stern was swinging out into mid channel, all her mooring ropes having broken. The Captain of one of the tugs in attendance on the *Titanic* took in the situation rapidly, and acting promptly, averted a collision. The first tow rope got aboard the *New York* broke, another rope was made fast, and the vessel held with her stern only about four or five feet clear of the *Titanic*. Meanwhile the *New York*'s bow was in danger of being pushed into the *Oceanic*'s starboard bow. Luckily the latter's ropes held, and after some excitement the *New York* was safely tied up again.

Now the terrible news has been received that the *Titanic* has foundered after collision with an iceberg. The White Star Company's offices are the scene of heartbreaking sights, as men and women relatives of the crew eagerly scan the latest news posted outside the Company's office door. An anxious crowd of weary, grief-stricken women stretches across the roadway. Needless to say, these tidings have plunged Southampton into a state of the greatest grief and anxiety.

Messrs. J. Samuel White & Co., East Cowes, I. of W.—Last month several launches for the Chilian and Argentine services ran satisfactory trials, and others for South America are nearing completion, and will shortly be running trials. The launch for Trinity House was inspected after completion and handed over about the middle of last month. Work is proceeding rapidly on the first pair of Chilian destroyers, and preparations are being made for the laying down of others for the Admiralty. The London County Council fire-boat is in frame, and all branches are fully occupied with work.

Messrs. Day, Summers & Co., Northam Iron Works, Southampton. The following yachts are undergoing their spring fitting out: *Vanduara* (owner, Mr. J. Mann Thomson), *Gramang* (Duchess of Westminster), and *Madrigal* (Mr. W. B. Paget). Several paddle steamers have been on the slip during the past month preparatory to commencing their summer season's programme. The tug-boat *Lincoln* is shortly due at the yard for her overhaul. The alterations to the *Robert Stevens* were completed, and the vessel left the yard last month. The after dap *Ocean* is also nearing completion.

Messrs. J. I. Thornycroft & Co., Ltd., Woolston Works, Southampton. Satisfactory progress has been made during the past month on the following torpedo-boat destroyers—H.M.S. *Hasty*, *Parade*, *Forward*, *Leader* and *Lynx*. The shell plating of the second tug ordered by the Admiralty is nearly completed. These vessels are paddle tugs, named respectively *Stanch* and *Steadfast*. There are several armoured motor patrol boats lying up at the work to the order of the Turkish Government. The delivery has been suspended owing to the continuance of the Turco-Italian war. The firm have just received an order for a Diesel engined yacht for the Grand Duke Cyril of Russia. Both hull and machinery will be built here. Several small launches are in hand, and the usual volume of general work has gone through the various shops. The Repairs Department have been well occupied, and among the vessels in hand for alterations and repairs are the following:—H.M. Ships *Halcyon* and *Hawarden*, s.s.'s *Sirdar* and *Jeanette*, steam hoppers *Scudhill*, *Merwede*, *Vigilant* and *Starborough*, etc.

THAMES.

(*From our Own Correspondent.*)

Shipbuilding.—We have unfortunately to record the loss of the order for the two cruisers to the Thames Ironworks Co., these vessels having been placed on the Clyde. The firm, it is said, could have had the orders at the price of £[illegible] for each vessel, but could not go lower than £[illegible] their reduced figure, and the Government would not vary its maximum and thus the business passed away. Financial difficulties were also encountered, but that of cost was really the stumbling block it is believed. If the Company be reconstituted, it will not be unlikely to suppose that with past successes there may be an opportunity of further orders, but at the moment this is the position of affairs as regards Admiralty work.

Shipping. The large liners have been very much in evidence since our last issue. Disasters have overtaken them and the P. & O. have had to bear with another collision this time in the Mediterranean, but happily attended with little loss and a complete exoneration of the officer in charge. The vessel, the *Syria*, was enveloped in fog and in collision with a French steamer, but she sustained practically little or no damage and was enabled to proceed after a very slight delay. Another line trading to the East, the British India Co., is said to have purchased the well-known fleet of Messrs. Apcar and Co., consisting of five steamers, the vessels trading between India, China and Japan. All sorts of rumours have been rife concerning large shipping properties. There has been a very substantial rise in the deferred stock of the P. & O. Co. of so points and a smaller one in Royal Mail ordinary stock. What is probable is that there is to be a working agreement between all the British lines running to Australia and if this is the case it would account for the rise indicated in some measure. The P. & O. Co. is said to be in an extremely favourable position as regards valuations of its assets and if therefore any combination is in prospect such valuations would tell strongly in the Company's favour and account for a large rise in the value of its shares such as we have seen. The great changes caused by the transfer of the Union Castle Line come into effect now, but it is as yet too early to say if the Thames will be a loser in any way directly by the turnover to the Royal Mail Co. Presumably we shall not have long to wait for an answer to this question which it is to be hoped will be in favour of the Thames continuing the home port for the vessels of this Line as heretofore.

Port of London. The increasing size of the vessels entering the port makes the provision of further docks accommodation urgent, and the new South Albert Dock which the Port of London Authority is about to construct includes in addition to a wet dock of [illegible] acres a dry dock [illegible] ft. long to be extended later to [illegible] ft. and a width of [illegible] ft. which makes it suitable for all future requirements. Dealing

however the carrying out of this work the question of enlarging the present dry dock accommodation of the Victoria and Albert Docks has engaged the attention of the authority, and it has been decided to reconstruct the western dry dock in the Albert Dock to give a length of 575 ft. and a width of 80 ft., which will cost £47,500, and take twelve months to execute. Further provision is to be made for extra cranes to secure expedition in the loading and unloading of cargoes and for these requirements twelve additional 30 cwt. hydraulic luffing cranes will be provided at the Victoria and Albert Docks, and six 35-cwt. similar cranes at the Surrey and Tilbury Docks all of the most modern design. The authority has had designs submitted to it for its new head offices, and in the competition certain selections are before this body for final decision thereupon.

Yachting. At the annual meeting of the Royal Thames Yacht Club at the new premises at No. 80, Piccadilly, the Vice-commodore Mr. A. Paget, M.P., took the chair and congratulated the members on their increased prosperity, both numerically and financially. The reason of this is that members had joined in large numbers from the over-sea dominions, and this had helped to make the club a headquarters for yachting men from all parts of the world. It was resolved also to charter the Royal Mail s.s. *Araguaya* of 10,500 tons, to go over to the international regatta at Kiel from June 20th to 30th next.

MERSEY AND MANCHESTER SHIP CANAL.

(*From our Own Correspondent.*)

WE regret that labour unrest still militates against the work of the port. The terrible loss suffered by the White Star Line has been deeply felt in this district. The flags upon all the shipping offices were flown half-mast as a mark of sympathy.

Messrs. Cammell, Laird & Co.—Work has been somewhat retarded due to the unfortunate engineers' strike, which unfortunately is still unsettled. The firm have renewed their offer of one shilling per week increase. The launching of the important Admiralty work in hand has been somewhat retarded, but it is hoped that very small delay will occur. The tender to submarine depot ship *Adamant* has finished fitting out and after running an acceptance trial has left for Portsmouth. The sister ship *Alecto* is now receiving her finishing touches, as is also the British destroyer *Lizard*. The *San Luis* destroyer for the Argentine Government passed through her official trials early in April, and will shortly be handed over to be followed by her three sister ships. The first steamer for the Norwegian-America service is making good progress, while the *Greenore*, building for the L. & N.W. Railway, has received her machinery and funnel, and is being finished off in the dry dock. The Australian cruiser *Melbourne* is expected to be launched at an early date; Lady Reid, wife of the High Commissioner, will, it is understood, perform the naming ceremony. The new "Dreadnoughts" building at Portsmouth and Devonport dockyards are to be named the *Iron Duke* and *Marlborough* respectively. Messrs. Cammell, Laird & Co. are supplying the machinery for the former and Messrs. Hawthorn, Leslie that for the latter. The large repairing facilities of the firm have been kept well employed. The Cork Steamship Co.'s *Kenmare* is in No. 5 dry dock having new boilers and floors put in. The G.W. Railway steamer *St. George* is in for general overhaul, while the Booth steamer *Dunstan* is in for bottom damage. The steamers, *La Marguerite*, *Snowdon*, *Mona's Queen* and *Zone* are in the wet dock for various repairs.

Messrs. H. & C. Grayson.—Notwithstanding the recent coal strike this firm kept going on full time, due to having an exceptionally good stock of coal. The coal strike gave owners an unlooked-for chance of laying steamers up for overhaul. This firm have been busy with a good deal of such work. The steamer *Yankalilla*, lately purchased by the Adelaide Steamship Co., of Australia, has had extensive repairs and alterations prior to taking up coastal duty in Australia. The steamer *Samson* has had a new engine bedplate and general overhaul. The steamer *Clifford* having had 20 ft. added to her length amidships, has been successfully floated and had her deck houses completed. The steamer *Dundalk* is also being repaired after the recent grounding at the mouth of the Mersey. It may be mentioned that Messrs. Grayson's headquarters are now in the New Royal Liver Buildings, and thus the old established repair firm are right in the midst of the shipping community.

Messrs. Clover, Clayton & Co.—This firm have had an extensive share of the large amount of repair work, due partly to recent heavy weather. Their recently improved docking facilities at Birkenhead have been fully taxed, as many as twelve vessels being in dock at one time. General survey and repair work has been the chief source of work.

British Corporation, Liverpool Committee.—Mr. Francis Henderson, the well known Liverpool shipowner, has recently retired from the chairmanship of the above corporation, Mr. Robert Clark having succeeded him. It has been decided to form a Liverpool committee and the following gentlemen have been nominated to serve upon it:—Sir Percy E. Bates, Bart., Mr. Ambrose Grayson, Mr. A. C. F. Henderson, Mr. Edmund Johnston, Mr. Charles Livingston and Mr. Alfred H. Read. Sir Percy E. Bates has been elected chairman and Mr. Johnston vice-chairman of the local committee. This corporation has completed twenty-one years' active service, during which time 3,000,000 tons of shipping have been built under their survey.

Messrs. Harland & Wolff's New Yard.—Messrs. Sir William Arrol & Sons, of Glasgow, have secured the contract for the buildings and cranes in the firm's new yard at Bootle. The initial outlay of £22,000 is to be made and at least twelve months will be needed for the work to be completed. It is expected that engines and boilers for the largest class of steamers will be built here.

Birkenhead Chamber of Commerce.—The inaugural meeting of the above was held in the Birkenhead Town Hall on April 3rd. The Mayor of Birkenhead presided, and amongst those present were Lord Derby, Lord Mayor of Liverpool, and the secretary of the Mersey Dock Board. Improved transport for goods to and from Birkenhead and Liverpool was advocated, while it was suggested that the Mersey Railway Co. might develop a good siding into Liverpool and Birkenhead to the great advantage of the local trade. It was also demonstrated that a larger amount of inward cargoes was one of the town's great needs. Birkenhead's prosperity is bound up in that of Liverpool.

NORTH-WEST OF ENGLAND.

(*From our Own Correspondent.*)

Barrow-in-Furness.—There are still very brisk times in the shipbuilding and engineering trades in this district, and, fortunately, the Vickers' firm were able to accumulate large stocks of fuel before the coal strike commenced, so that it has not been necessary to stop work in any of the departments. Indeed the firm had plenty of supplies to find many of their workmen with fuel. Of course the strike was felt in the difficulty of getting deliveries of material owing to the reduced train service, but in this respect as many of the required classes of material as possible had been secured before-hand, and the delay was not serious after all. But the needs of such a gigantic establishment are great, and frequently it happens that the want of some simple article keeps a deal of work back. However, this district has got over the strike exceedingly well, and supplies of all requirements are coming in very satisfactorily.

Reported New Order.—It is reported that Messrs. Vickers, Ltd., have secured another order from the British Admiralty for the construction of one of the protected cruisers of the "**Dartmouth**" class, but this needs official confirmation. It is known, however, that the firm sent in the lowest tender, and it is assumed, intend to devote themselves to the construction of all classes of Admiralty work. They have already delivered two vessels of this type, the *Liverpool* and the *Dartmouth*, which on trial proved very successful. Messrs. Vickers have plenty of berth space in their shipyard at Barrow, and could lay down at one time half-a-dozen of the largest "Dreadnoughts," as well as a dozen smaller vessels.

The Japanese Battle-Cruiser "Kongo."—It has now been definitely fixed to launch this vessel on the 18th of May, and the occasion is to be one of marked importance. Particulars of her design have been kept as secret as possible, and as the Japanese Government made this one of the conditions of the order, there has been no attempt to get hold of information which it was not otherwise possible to secure. At any rate the vessel is known to be larger than the *Princess Royal* building for the British Admiralty, and as she is intended for the same sort of work she is probably so arranged as to follow the lines and the scope which dictated the construction of the fast cruisers built and still building for the British Navy. There is some talk of other orders of an important character coming from Japan, but nothing is known outside the works of the truth or otherwise of this story. The representatives of the Japanese Government seem to think they will be staying in the town for some years yet, and they have opened a club at which they meet every night.

The Turkish "Dreadnought."—The building of the Turkish battleship *Reshadiye Hamiss* is proceeding very smartly, and as most of the material required is to hand, considerable strides are being made day by day. A considerable number of Turkish gentlemen, experts in shipbuilding and in the work generally of building a great fighting ship, are residents in Barrow, and are very assiduous in looking after all the details of construction. The vessel will be quite up-to-date in every respect, and it is expected she will possibly be the forerunner of other orders for the local firm, as this vessel and her sister ship building at Newcastle are only the first instalment in the work of providing a big fleet for the Turkish Government. The engines of the vessel are being proceeded with in the engineering department of Messrs. Vickers' yard, and will be ready to lower into the vessel immediately she is launched.

H.M.S. "Princess Royal."—This battleship-cruiser is approaching completion. She would doubtless have been ready to proceed on her trials in April had it not been for the alterations which have been necessary, owing to the need of the same, shown in the trials of her sister ship the *Lion*. Messrs. Vickers are making these alterations in the *Princess Royal* at Barrow, and also in the *Lion* at Portsmouth, and doubtless both vessels will be ready for trial about the same time. It will probably be June before this can take place, but all the best efforts of the firm are being directed to an early completion of both vessels.

The Montreal Floating Dock.—This huge dock is to be launched during May. She is an immense structure, and the ground on which she stands is required for other ships which the Vickers' firm have to lay down. After being launched she will be fitted together, making her three sections into one huge dock, and then she will be towed out to Montreal at a time when the St. Lawrence is free from ice. A considerable number of members of the Black squad are employed in her construction, and when she is launched these men will, to a large extent, be transferred to other important work in the hands of the firm. There is a great demand for platers, riveters and others employed in ship construction, and every week new men are being imported to Barrow to take up work here. There is, however, a great scarcity of houses in the town, and most of the men who come here are finding it necessary to go into lodgings until more houses are available.

H.M.S. "Phœnix."—This torpedo boat destroyer is nearly ready to go on her acceptance trials. She is reported to have exceeded all expectations, and to have steamed at a very great speed indeed, but as she is the first of this class of vessel to be driven with liquid fuel, the firm decline to give any particulars of her achievements. More will be heard of her later on.

Engineering.—Work in the engineering department is very brisk, and the need of further extensions of the already very large department has been forced upon the Vickers firm. A very large addition to the works is now in course of being provided, and it is already known this addition will not be large enough for the needs of the situation, as there is need of more room and more machinery shop for the marine department and for gun mounting, and this it will be necessary to provide by some means or other in the near future.

Shipbuilding Material.—The price of shipbuilding material has gone up of late. Ship plates are at £7 10s. to £7 15s. 0d., and boiler plates at £8 10s. 0d. The plate mills at the Barrow Steel Works, which have been idle for two or three years, are about to be put in operation again.

BELFAST.

(From our Own Correspondent.)

State of Trade.—Great activity is still maintained in the shipbuilding trade on the Lagan. Every slip is occupied, and further orders continue to be booked so that the local builders have a long period of activity before them. All the orders in hand are for vessels of high-class. The vessels at present at the fitting out wharves represent an aggregate of 50,000 tons.

Messrs. Harland & Wolff have no fewer than four vessels fitting out for the Royal Mail Steam Packet Company—the sister ships *Desna*, *Demerara* and *Dessa* and the big mail and passenger liner *Arlanza*. The new twin-screw passenger steamer *Patia* built by Messrs. Harland & Wolff for the Belfast Steamship Company, has taken up her station on the Company's service between Belfast and Liverpool. The *Patia* is similar to the *Hesperia* and *Graphic*, also built at the Queen's Island for the same owners, but the accommodation has been increased in the latest addition to the fleet, a special feature being the large number of single berth rooms. Since last month's notes were published they have completed and despatched the *Laurentic*. To chronicle the departure of the largest and finest vessel in the world—a vessel embodying all the latest improved features in naval architecture—and to have to refer in the same column to the total loss of that leviathan on her maiden voyage seems almost incredible. The catastrophe is simply appalling—one beside which all previous maritime disasters fade into comparative insignificance. Some weeks since Lord Pirrie contracted a severe illness and this trouble has proved a blessing in disguise, for it is stated that he had intended crossing with the *Titanic*. World-wide sympathy will be extended to the White Star Company and to the relatives of those who have been overtaken by so sudden and awful a fate.

Since writing above note word has been received that Mr. Thos. Andrews, junr., one of Messrs. Harland & Wolff's managing directors, and a number of the firm's staff have all lost their lives in the sinking of the *Titanic*, and expressions of the deepest sympathy have been extended to the Queen's Island firm. A reference to, and photo of, the late Mr. Andrews will be found in another column.

Messrs. Workman, Clark & Co. launched on 31st March the new steamer *Tientsin*, which they have built to the order of the China Mutual Steam Navigation Co., Ltd. (Messrs. Alfred Holt & Co.). Her lengths are [illegible] ft., and gross tonnage [illegible]. Triple expansion engines are being fitted, steam being supplied by two double-ended boilers. They have several other vessels of big dimensions fitting out, and still have the Ellerman liner *City of Lucknow* in graving dock for repairs, in addition to which they have executed minor repairs to several other vessels.

New Head Liner.—Messrs. Irvine's Shipbuilding and Dry Docks Co. have launched a new steamer named *Black Head* for the Ulster Steamship Co., Belfast (popularly known as the Head Liner). The vessel measures [illegible] ft. long by [illegible] ft. 6 in. beam by [illegible] ft. 6 in. deep. She is intended for the owners' Baltic trade.

LAUNCHES AND TRIAL TRIPS.

LAUNCHES. English.

Sorrento.—On March 8th, there was launched at Hull a finely modelled steel screw steamer named *Sorrento*, which has been built to the order of Messrs. Thomas Wilson, Sons and Co., Ltd., for their Mediterranean and Baltic trades. The vessel is [illegible] ft. long by [illegible] ft. 6 in. beam by [illegible] ft. 6 in. deep. She has been constructed of steel throughout to the Lloyd's Corporation highest class, and to the latest Board of Trade requirements. The vessel is of the shelter deck type with

saloon deck-house amidships, in which are situated the officers' rooms, the engineers being berthed in side houses abreast the engine casing. She has very efficient appliances for the speedy handling of cargo. Triple-expansion engines are provided, steam being supplied by two large steel boilers. The vessel is to have a good speed on a minimum coal consumption.

Dinorah.—On March 16th, Messrs. William Doxford & Sons, Ltd., launched from their yard at Pallion, Sunderland, an 8,000-ton single-deck vessel, built to the order of Messrs. M. U. Martinolich & Co., Lussinpiccolo, Austria. The engines and boilers are being constructed by Messrs. Doxford. The vessel has been built to British Corporation and Austrian Veritas classifications.

Rockpool.—On March 18th, Messrs. Ropner & Sons, Ltd., Stockton-on-Tees, launched from their shipbuilding yard a steel screw steamer of the following dimensions, *viz.*: Length, 392 ft. 6 in.; breadth, 56 ft.; depth, 26 ft. 9 in. The vessel will be classed 100 A1 at Lloyd's, having main deck, poop, long bridge and topgallant forecastle. Accommodation for captain, officers and engineers in houses on bridge deck, crew in the forecastle. The vessel has double bottom for water ballast on the cellular principle, and in fore and after peaks. She will be fully equipped with an up-to-date outfit, including quick-warping windlass, stockless anchors, steam-steering gear amidships, and powerful screw gear aft. The appliances for loading and discharging cargoes expeditiously are very complete, and include ten steam winches, double derricks to each hatch, steam being supplied by a large donkey boiler, working at 100 lbs. pressure per square inch. The engines will be of the triple-expansion type by Messrs. Blair & Co., Ltd., Stockton-on-Tees, of about 2,450 I.H.P., having three steel boilers 14 ft. 9 in. by 11 ft., 180 lbs. pressure of steam.

Arabistan.—On March 19th, Messrs. William Gray & Co., Ltd., launched the large steel screw steamer *Arabistan*, which they have built for Messrs. Frank C. Strick & Co., Ltd., of Swansea and London. The vessel will take the highest class in Lloyd's Register and is of the following dimensions, *viz.*:—Length overall, 412 ft. 6 in.; breadth, 53 ft. 6 in.; and depth, 29 ft. 7½ in. She is a handsomely modelled vessel of the double-deck type with poop, long bridge and topgallant forecastle, having very tasteful cabin accommodation in houses on the bridge deck for passengers, captain and officers, and is fitted throughout with electric lighting. The vessel has a cellular double bottom and after-peak tank for water ballast, and in addition there is a deep tank or hold compartment fitted for water ballast abaft the engine-room, giving a total capacity for water ballast of about 2,200 tons. The whole of the outfit, including steam windlass, steam-steering gear, two derricks to lift 30 tons each, twelve steam winches with return exhaust to winch condenser of the Contraflo type, are of the most approved description. The machinery is made by The Central Marine Engine Works of the builders, being of the triple-expansion type, with cylinders 28 in., 46 in. and 77 in. diameter, with a piston stroke of 48 in. She is fitted with a Contraflo main condenser, Weir's feed pumps and heater, and three large steel multitubular boilers working by Howden's forced draught at a pressure of 180 lbs. per square inch.

Katoa.—On March 19th, Messrs. Osbourne, Graham & Co. launched from their yard at Hylton a steamer which they have built to the order of The Union Steam Ship Company of New Zealand, Ltd. The vessel has been constructed to take highest class at British Corporation, and is the fifth steamer built by this firm and owned by the Union Company. She is of the single-deck type, with poop, bridge and forecastle, having absolutely clear holds, and is of the latest principle of construction throughout. She has been designed to carry 3,700 tons on a light draught. Her principle dimensions are 309 ft. by 45 ft. by 22 ft. 1 in. moulded. Accommodation for crew and firemen is arranged in the poop. Long bridge is fitted, on top of which is accommodation for all officers and also a few passengers. Above this there is a navigating bridge with teak charthouse, wheelhouse and flying bridge. Accommodation has been handsomely fitted out in hardwood. Forecastle is fitted out for stores, etc. The vessel has been equipped with most modern appliances, and has an outfit which is complete in every detail. Eight special winches have been supplied by Messrs. Clark, Chapman and Co., of Gateshead; special warping winch is by Messrs. John Lynn & Co., Ltd., of Sunderland; electric light will be fitted throughout by the Sunderland Forge and Engineering Co. "Bitumastic" solution has been applied in bunkers and the boiler room by Messrs. Wailes, Dove & Co. The engines, which have been designed to drive the vessel at a high rate of speed, are being supplied by Messrs. George Clark, Ltd., having cylinders 24 in., 40 in., 65 in. by 42 in. stroke, with two boilers 17 ft. 3 in. by 11 ft. 6 in.

Steel Screw Steamer.—On March 21st, Messrs. Wood, Skinner & Co., Ltd., of Bill Quay, Newcastle-on-Tyne, successfully launched from their shipbuilding yard a steel screw steamer, which they have built to the order of Mr. Otto Thoresen, of Christiania, Norway, for the Mediterranean and Black Sea Trade. The vessel is constructed to carry a deadweight of 4,750 tons on a light draught of water, and is of the single-deck type, with poop, extended bridge and topgallant forecastle, being designed and fitted to comply with the Board of Trade requirements for carrying grain in bulk. The saloon and cabins are arranged in a large steel deck-house on the bridge deck, with chartroom and captain's accommodation in house on upper bridge above, the officers and engineers being berthed in side houses at the after end of the bridge and the crew in the topgallant forecastle. Large water ballast capacity is provided in the cellular double bottom all fore and aft, and in the fore and after-peak tanks. The vessel will have five hatches, each worked by double derricks of Mannesman steel tubes, and will also be fitted with eleven powerful steam winches, direct-acting steam windlass, steam-steering gear in the engine-room, controlled from the flying bridge and complete electric light installation throughout. The machinery, which will be of the improved triple-expansion type, supplied with steam by two large steel multitubular boilers, having Howden's forced draught arrangements and fitted with Schmidt's patent superheaters, has been constructed and will be fitted by the North-Eastern Marine Engineering Co., Ltd., at their Northumberland Engine Works, Wallsend-on-Tyne. The ship and machinery have been built to the requirements and under the special survey of Norske Veritas, for their highest classification, and have also been constructed under the superintendence of Mr. Carl Conradi, of Christiania.

Clan MacEwen.—There was launched recently from the Hebburn shipyard of Messrs. Palmer's Shipbuilding & Iron Co., Ltd., the first-class cargo steamer *Clan MacEwen*, built to the order of Messrs. Cayzer, Irvine & Co., Ltd., Glasgow (Clan Line), for their Australian trade. The vessel's length is about 445 feet, and she has been built to the highest class in the British Corporation. She has three complete steel decks, shelter, upper and main. The officers' accommodation is situated in bridge, with captain's cabin in deckhouse over, engineers being berthed in side houses on shelter deck abreast engine casing, and firemen and seamen on upper deck. The vessel is to be fitted by the builders with triple-expansion engines of about 4,000 horse-power, the boilers being four in number. Messrs. Wailes, Dove & Co.'s "Bitumastic" enamels have been applied to the bunkers and coal shoot.

Hartford.—There has been launched at South Shields a steel screw cargo steamer of the following dimensions:—Length 143 ft., breadth 24 ft. 3 in., and depth 11 ft. 9 in. She will class 100 A1 at Lloyd's, and has been fitted for the general coasting service. The propelling machinery consists of one set of compound surface condensing engines capable of developing 450 i.h.p. She has been built for the Northwich Carrying Company, Ltd., of Northwich.

Waterford.—Messrs. Swan, Hunter, & Wigham Richardson, Ltd., have launched from their Neptune Works, Newcastle-on-Tyne, a steel screw steamer for the Great Western Railway. The vessel is 275 ft. in length by 38 ft. beam, and is intended for the Irish Channel service of the Great Western Railway, and has comfortable accommodation for passengers. She has fittings to carry a large number of cattle, and will also on occasion be able to be used as a tender. Her propelling machinery consists of twin-screw quadruple expansion engines which, with their boilers, are being constructed at the Neptune Works, and which are expected to propel her at a speed of 15 knots per hour. Messrs. Wailes, Dove & Co's. "Bitumastic" Enamels have been applied to the bunkers, peaks, open bottom, and their Patent "Bitumastic" Covering to the waterways.

Luise Horn. On March 28th, Messrs. Craig, Taylor & Co., Ltd., launched from their Thornaby Shipbuilding Yard, Stockton-on-Tees, a handsomely-modelled screw steamer of the following dimensions: 374 ft. by 50 ft. by 31 ft. 4 in. moulded to bridge deck. She is built of steel to the highest class in Lloyd's Registry, and has long poop and topgallant forecastle. large water ballast capacity in double bottom fore and aft, and in peaks; she is equipped with patent direct steam windlass with quick warping ends, steam-steering gear, eleven steam winches, double derricks and gaffs to each mast, stockless anchors, large hatches and all the latest improvements for rapid loading and discharging. The masts have been arranged to suit the Manchester Ship Canal requirements; steel shifting boards are fitted throughout holds and 'tween decks for the carriage of grain cargoes. The accommodation for Captain, spare rooms, and officers, is neatly fitted up in deck houses amidships on bridge, the engineers being in deck houses alongside engine casing, and the crew in the forecastle. Her engines have been constructed by Messrs. Richardsons, Westgarth & Co., Ltd., Middlesbrough, the cylinders being 25 in., 41 in. and 68 in. by 48 in. stroke, with two large boilers working at 180 lbs. pressure including Howden's forced draught, etc. The vessel has been built to the order of H. C. Horn, Esq., of Schleswig.

Normanton. On March 20th, Messrs. Sir Raylton Dixon and Co., Ltd., launched from their Cleveland Dockyard, Middlesbrough, a fine steel-screw collier which they are constructing to the order of The Denaby and Cadeby Main Collieries, Ltd., of London, etc. The vessel is being built to class 100 A1 at Lloyd's, and is of the single deck type, with poop, bridge and topgallant forecastle. Her principal dimensions are 372 ft. by 52 ft. by 26 ft. 3 in. moulded, and she will carry about 7,100 tons on a light draught of water. Saloon and accommodation for Captain will be provided in large deck house at fore end of bridge, and chart house on top. The engineers and officers will be berthed in houses at sides of engine casing, while the crew will be located in forecastle. The vessel will have four large holds, five hatches, two masts, eleven derricks, and will be equipped with ten steam winches, steam windlass, hand and steam steering gear and all the latest and most modern appliances for the rapid handling of cargo. Triple expansion engines having cylinders 25 in., 41 in. and 67 in. by 45 in. stroke, supplied with steam by three large single-ended boilers working at 180 lbs. pressure, will be fitted by Messrs. George Clark, Ltd., Sunderland.

Freland. On April 2nd, the s.s. *Freland*, built to the order of Messrs. Nourse Traders, Ltd., of London, by the Northumberland Shipbuilding Co., Ltd., of Howdon-on-Tyne, was satisfactorily launched. Her dimensions are: Length between perpendiculars, 370 ft.; breadth, 51 ft., and depth moulded, 25 ft. 7 in. She is built to the highest class at Lloyd's, and has been constructed under the supervision of Messrs. Flannery, Baggallay & Johnson, Ltd., of London, Liverpool and Rotterdam, the owners' superintendents. She is fitted with ten steam winches and ten derricks and the latest appliances for the quick handling of cargo. The vessel is fitted with triple expansion engines by Messrs. Richardsons, Westgarth & Co., Ltd., of Sunderland, having cylinders 25 in., 41 in. and 69 in. by 48 in. stroke, which take steam from three large cylindrical multitubular boilers with a working pressure of 180 lbs. per square inch. Messrs. Walls, Dove & Co.'s "Bitumastic" enamels have been applied to the lower pocket bunkers.

Cyelse. On April 3rd, there was launched from the yard of Messrs. Cochrane & Sons, Selby, a steel screw trawler, the principal dimensions being 124 ft. by 23 ft. 7 in. by 14 ft. 7 in. moulded. The vessel has been built to the order of Mr. D. Pettit, of Milford Haven, and will be replete with all the latest improvements for the fishing trade. She will be fitted with powerful triple expansion engines by Messrs. C. D. Holmes & Co., Ltd., of Hull.

Shwedagon. On April 3rd, there was launched on the Tyne a steel cargo tank steamer, built to the order of Messrs. Steel Brothers & Co., Ltd., of London, on behalf of the Indo-Burma Petroleum Company, Ltd., of Rangoon. The chief dimensions of the vessel are: Length over all, 400 ft.; Length between perpendiculars, 390 ft.; Breadth extreme, 54 ft.; and depth moulded, 31 ft. The deadweight is 4,[illegible] on a mean draught of 23 ft. 6 in. The vessel has been built on the Isherwood system of longitudinal framing to Lloyd's special survey for their highest class. A special feature of the vessel is that the whole of the side 'tween deck tanks and the midship tanks are arranged for the carriage of cargo or bulk oil as may be desired. The propelling machinery is of the triple-expansion type manufactured by the Wallsend Slipway and Engineering Co., Ltd., having cylinders 19 in., 31 in. and 51 in. by 36 in. stroke, steam being supplied by two boilers 13 ft. in diameter by 11 ft. 6 in. long, working at a pressure of 180 lb. per square inch.

LAUNCHES—Scotch.

Hopper No. 8.—On March 30th, a steel hopper of about 840 tons gross, named *Hopper No. 8*, was launched at Renfrew, from the yard of Messrs. Lobnitz & Co., Ltd. The vessel has been built for the Clyde Navigation Trustees. Messrs. Walls, Dove & Co.'s "Bitumastic" cement has been applied to the flat surfaces, and their patent "Bitumastic" solution to the vertical and underside faces.

Fitzroy. On March 30th, there was launched from the yard of Messrs. Napier & Miller, Ltd., Old Kilpatrick, the steel screw steamer *Fitzroy*, built to the order of Messrs. Langley Bros., Sydney, through Messrs. Jas. Pollock, Sons and Co., Ltd., London, for the Australian coasting trade. The vessel's dimensions are:—Length, 170 ft.; breadth, 30 ft.; moulded depth, 21 ft. 3 in., with a gross tonnage of about 700 tons, built to Lloyd's Rules for their highest class. The vessel is rigged as a two-masted schooner, has main, promenade and boat decks. Accommodation for fifty first class passengers is provided for in state rooms on promenade deck and on main deck aft, with dining saloon, social hall and smoking room, on the promenade deck. Electric light is fitted throughout. The vessel has steam windlass, steam steering gear, and water ballast in fore and aft-peak tanks, refrigerating machinery is also being fitted, and the after hold has been insulated for the carriage of frozen meat cargoes, with fittings on deck for forty head of cattle. Machinery consists of triple-expansion engines, and one large boiler is being supplied by Messrs. Atchison, Blair, Ltd., Whitecrook Engine Works, Clydebank. During construction the vessel has been under the supervision of Mr. Thomas Murray.

H.M.S. Endeavour. On March 30th, H.M.S. *Endeavour* was launched by the Fairfield Shipbuilding and Engineering Company, Govan. The vessel has been specially designed and built for the work of surveying the navigable waters of the world, and she is the first vessel specially constructed for this purpose by the Admiralty. The *Endeavour* is a vessel of 1,300 tons displacement and 13 knots speed. She is 266 ft. long by 34 ft. wide, and has accommodation for 130 officers and men. She is propelled by twin screws, each driven by a set of triple-expansion engines having cylinders 18 in., 29 in. and 33 in. diameter by 30 in. stroke. Her special equipment for survey purposes consists of a special sounding winch, sounding machines, derricks, platforms and jackstays, laboratory with drawing table, work table, sink and chronometer room, and a well-equipped photographic dark-room.

Clyde. On March 30th, there was launched at Ayr the twin screw tug *Clyde*, which has been built to the order of the Clyde Navigation Trustees. The vessel was afterwards towed to Troon to be supplied with machinery.

Jacuhy.—On April 2nd, there was launched at Govan the twin screw steamer *Jacuhy*, built to the order of Messrs. John M. Campbell & Son, Glasgow, for the Companhia Commercio e Navegacao, Rio Janeiro. The *Jacuhy* is a sister ship to the *Tacuary*, which was built recently for the same owners. The *Jacuhy* has been built to Lloyd's requirements for the Brazilian coasting service. Accommodation is provided for a number of passengers in state rooms, with a large dining saloon on the bridge. The machinery consists of two sets of triple-expansion engines designed to give a speed of ten knots in service. Messrs. Walls, Dove & Co.'s "Bitumastic" enamels have been applied to the bunkers and coal bunk.

Queen Alexandra. On April 4th, the *Queen Alexandra*, a sister ship of the *Queen Victoria*, which is now in service in Vancouver, but was built in Scotland, the Clyde fleet, was launched at Dumbarton. She has been built to the order of the Clyde Marine Steamer Ltd., and will be placed on the Campbeltown service.

Jacatra.—On April 9th, there was launched at Port Glasgow a steel screw steamer of the following dimensions:—Length, 435 ft., breadth, 53 ft., and depth, 31 ft. 6 in. to upper deck. This vessel, which was named *Jacatra*, has been built to the order of the Stoomvaart Maatschappij Rotterdamsche Lloyd, of Rotterdam, for their Eastern cargo and pilgrim trade. The vessel is fitted throughout with electric light and fire extinguishing installation. After the launch the vessel was taken in tow to Glasgow, where the machinery, which consists of a set of triple expansion engines, will be fitted.

Steel Screw Steamer.—On April 16th, Messrs. Archd. McMillan & Son, Ltd., Dumbarton, launched a steel screw steamer which they have built for English owners. The vessel, which is constructed on the Isherwood system, is of the single deck type, with complete shelter deck, and a lower deck is fitted in the forward hold. The dimensions are:—Length between perpendiculars, 370 ft.; breadth, 51 ft.; depth moulded to shelter-deck, 36 ft. 9 in., and the vessel, which is designed with a fine coefficient to give a speed of about 10½ knots, will carry a large cargo on a light draught. The machinery is being supplied by Messrs. Rankin and Blackmore, Greenock, and both vessel and machinery have been built under special survey of Lloyd's for their highest class.

Steel Screw Steamer.—Messrs. Russell & Co., Port Glasgow, recently launched from their Kingston yard a steel screw steamer of a superior class for the general cargo-carrying trade of Messrs. Gow, Harrison & Co., Glasgow. The vessel has been built to the highest class at Lloyd's, and is of the following dimensions:—Length, 423 ft., breadth, 56 ft., depth, 30 ft.; gross tonnage, 5,554. Triple-expansion engines will be supplied by Messrs. J. G. Kincaid & Co., Greenock. During construction the steamer was superintended by Mr. Charles Edington, superintendent of the owner's fleet, assisted by Captain Crocker.

Twin-screw Steamer.—The Ailsa Shipbuilding Company, Troon, have recently launched the second of the four twin-screw steamers which they have on hand for the South American clients of Messrs. John M. Campbell & Son, Glasgow. The new steamer is a high-class passenger and cargo vessel, and is of the following dimensions:—Length between perpendiculars, 288 ft.; breadth, 43 ft.; and depth, 18 ft. 9 in. The machinery will be supplied by the builders.

Oswald.—Messrs. Wm. Simons & Co., Ltd., of Renfrew, have recently launched a dredger, of the well-known "Simons" Suction Reclamation type, for the Indian Government. The vessel is intended for the improvement of the waterways in Burma. The *Oswald* is a twin-screw light-draught cutter dredger, and will work in conjunction with a floating pipe line and terminal pontoon, arranged for delivering dredged material over river or canal banks for land reclamation. The dredging pump is driven by an independent set of triple-expansion engines, and the suction pipe is carried on a frame fitted in well at forward part of vessel. The lower end of suction frame is fitted with a steel spiral rotary cutter, driven by cast-steel machine-cut gearing from a set of horizontal compound engines placed on deck. The gearing and cutter are of ample strength to stall the engines when working at full power. Independent steam hoist gear is provided for controlling the suction frame, and very powerful manœuvring winches are placed at each end of vessel. An operating house is provided on upper deck, containing all necessary levers and telegraphs to enable one man to have complete control of the dredging operations. The dredger is propelled by twin screws, each driven by a set of triple-expansion engines. Steam is supplied by two cylindrical multitubular boilers, constructed to Lloyd's requirements for a working pressure of 160 lbs. The boilers are fitted with Howden's forced draught for burning Indian fuel. A complete installation of condensing plant, capable of dealing with exhaust steam from all the engines in the vessel at one time, independent automatic feed pumps, bilge pumps, service pumps, pressure pumps, filters and all the other usual auxiliaries for a vessel of this type, are provided in engine-room. A repair-shop, with electrically-driven machine tools capable of overtaking minor repairs, is fitted on board. Electric light installation is provided both above and below deck. The vessel is provided with every accommodation necessary for a crew working in a hot climate.

Firedrake.—The fast ocean-going torpedo-boat destroyer *Firedrake* was launched recently from Messrs. Yarrow & Co.'s yard at Scotstoun. This vessel is the first of three special destroyers, 355 ft. in length and 35 ft. 7 in. in beam, and having a contract speed of 30 knots. The propelling machinery consists of Parsons turbines driving two shafts, steam being supplied by three Yarrow water tube boilers fitted for burning oil fuel only.

LAUNCH—Irish.

Demodocus.—On March 21st, the extensive fleet of steamers owned by the China Mutual Steam Navigation Co., Ltd., Liverpool (Messrs. Alfred Holt & Co., Ltd.), received an important addition by the launch of the s.s. *Demodocus*. The new steamer has been built by Messrs. Workman, Clark and Co., Ltd., Belfast, for the owners' trade in the Far East, and is 400 feet in length, with a gross tonnage of 6,800. State rooms for saloon passengers are arranged on the boat deck, with accommodation for Chinese pilgrims in the 'tween decks. As the vessel is for service in tropical climates, special attention has been given to the ventilation throughout. The cargo space is divided into six holds, and the decks being supported on fore and aft girders, these holds are unobstructed by pillars, and are capable of receiving cargo consignments of large dimensions, such as locomotives, motor cars, and general machinery. The propelling machinery consists of a set of triple-expansion engines, complete with auxiliaries and supplied with steam from two double-ended multitubular boilers, with an auxiliary boiler for the deck machinery.

TRIAL TRIPS.

Wyvisbrook.—On March 15th, the steamer *Wyvisbrook*, built at Sunderland, to the order of Messrs. Miller & Richards, of Glasgow, ran a successful trial. The vessel is of the single-deck type, and will carry about 5,500 tons on a light draught. She has absolutely clear holds, large hatches, and up-to-date appliances for rapid discharging. The engines have been fitted by the North-Eastern Marine Engineering Company, Ltd., at their Sunderland works. Under the command of Captain McWilliams the steamer afterwards sailed for Hampton Roads.

Brocklesby.—On March 23rd, the paddle-steamer *Brocklesby* (the first of the two steel vessels of this type), built to the order of the Great Central Railway Company, for passenger (ferry) service between Hull and New Holland, by Messrs. Earle's Shipbuilding and Engineering Company, was taken for her official trial. The vessel was tried on the measured mile at Sunk Island, when a speed of 13½ knots was easily obtained; afterwards extensive manœuvring tests were carried out to the entire satisfaction of all concerned. The owners were represented by Mr. F. Barwick, Captain Boothby and Mr. J. A. Rodger, and the builders by Messrs. A. H. Tyacke and J. A. Sturrock. For Launch, see April issue.

Patriotic.—On March 28th, the fine express steel twin-screw steamer *Patriotic*, built by Messrs. Harland & Wolff, Ltd., for the Belfast Steamship Co., Ltd., had a very satisfactory trial trip and cruise. The new vessel is a great acquisition to the cross-Channel service between Belfast and Liverpool, and has superior accommodation for a large number both of saloon and steerage passengers. The company on board included the Chairman of the Belfast Steamship Co., Ltd., Mr. Thomas Gallaher and the Directors, also Mr. James Maxton, naval architect and consulting engineer. There was also a distinguished company of visitors on board, and Mr. Gallaher was the recipient of hearty congratulations on the fine behaviour of the new steamer, and the enterprise of the Company in so soon adding to their fleet another vessel of the *Heroic* and *Graphic* type, with all the latest improvements and greatly-increased number of single-berth rooms. The fact of Belfast shipowners showing their confidence in Belfast shipbuilders was referred to as particularly gratifying to the whole community, and it was felt the name of the new ship, *Patriotic*, was exceedingly appropriate, as emphasizing the patriotism of the Chairman, Mr. Gallaher, and his colleagues, as shown in their efforts to develop the trade between Great Britain and Ireland, and strengthen the connection between these islands by the

ties of commercial interest. For Launch, see October, [illegible] issue.

Itapura. On March [illegible]th, the new twin-screw steamer *Itapura*, built and engined by the Ailsa Shipbuilding Company, Troon, to the order of Messrs. John M. Campbell & Son, Glasgow, for South American owners, ran trials on the Clyde. For Launch, see March issue.

H.M.S. Attack. On March [illegible]th, H.M.S. *Attack*, one of the special destroyers, with superheaters, which are being built for the British Admiralty by Messrs. Yarrow, of Glasgow, ran very successful official full-speed trials on Skelmorlie deep-water measured mile, attaining a mean speed, during a continuous run of eight hours, of [illegible] knots, thus exceeding the contract speed of 28 knots by 2·6 knots.

Hochelaga.—On April 6th, the cantilever-framed steamer *Hochelaga*, built by Messrs. Sir Raylton Dixon & Co., Ltd., at their Cleveland Dockyard, Middlesbrough, to the order of Messrs. Furness, Withy & Co., Ltd., of West Hartlepool, London, etc., proceeded to sea for her official trials. The trials passed off most successfully, a speed of over [illegible] knots being attained. For Launch, see March issue.

Dago.—On April 13th, the s.s. *Dago* ran her official trial trip. This vessel has been built by Messrs. Osbourne, Graham & Co. to the order of the Russian East Asiatic Co., Ltd., of St. Petersburg, through Messrs. C. H. Pile & Co., of London. Her principal dimensions are [illegible] ft. by [illegible] ft. by 13 ft. 6 in. moulded, and she carries a large cargo on a very shallow draught. The engines, which have been supplied by Messrs. Earles' Shipbuilding and Engineering Co., Ltd., of Hull, are capable of driving the vessel at a speed of [illegible] knots loaded. During the trial everything was satisfactory.

Florentia.—On April 15th, the s.s. *Florentia*, built by the Tyne Iron Shipbuilding Co., Ltd., to the order of the International Line Steamship Co., Ltd., of Whitby, was taken for her trial trip off the Tyne. The engines, which have been built by Messrs. John Dickinson & Sons, Ltd., Pelaw's Hill Engine Works, Sunderland, have cylinders [illegible] in., [illegible] in. and [illegible] in. by [illegible] in. stroke, with two large single-ended boilers, 180 lbs. working pressure, and they were run on a series of different speeds so as to obtain progressive speed results, and the trials were in every respect a complete success. For Launch, see April issue.

Trevanion. On April [illegible]th, the new steel screw steamer *Trevanion*, built by Messrs. John Readhead & Sons, Ltd., West Docks, South Shields, to the order of Messrs. Edward Hain & Son, St. Ives, was taken to sea on her official trial trip. The trial was in every way satisfactory to all parties concerned, and the vessel proceeded on her voyage to Madras under the command of Capt. James Sullan. This is the fifty-eighth vessel built for the above firm by Messrs. John Readhead & Sons, Ltd. For Launch, see April issue.

Queen Louise.—The steel screw steamer *Queen Louise*, built by the Northumberland Shipbuilding Co., Ltd., Howdon-on-Tyne, to the order of Messrs. Thos. Dunlop & Sons, Glasgow, has just undergone her official trial trip. The trial trip proved in every way successful, and a speed of 12 knots was obtained. Among the guests on board were the following:—Mr. Thos. Dunlop, Mr. Peter Dunlop representing the owners, Mr. J. Graham representing the builders, Mr. Summers Hunter and Mr. Daglish representing the engine builders. After the trial trip the vessel proceeded to Middlesbrough under the command of Captain MacDonald, and thence to Australia. For Launch, see April issue.

Pulganbar. The new steamer *Pulganbar*, built by the Greenock and Grangemouth Dockyard Company, Grangemouth, for the North Coast Steam Navigation Company, Sydney, N.S.W., has recently run trials in the Firth of Forth, and attained a mean speed of [illegible] knots. For Launch, see March issue. Messrs. Mattress Kerman & Co., Ltd., have just completed the contract to cover all the boilers and steam pipes with their patent non-conducting composition.

La Palma. The new passenger and cargo steamer *La Palma*, built by Messrs. W. Harkess & Son, Ltd., Middlesbrough, to the order of Messrs. Elder, Dempster & Co., Ltd., of Liverpool, has just completed her [illegible] trial trip. A mean speed of [illegible] knots per hour was maintained during 12 hours' continuous trial. The owners were represented by their superintendent, Mr. G. P. Ashburner, who was highly satisfied with the results obtained. This is the second vessel the Company have built for their trade. For Launch, see April issue.

BOARD OF TRADE EXAMINATIONS.

MARCH 21st, 1912. LONDON.—[illegible] W. Fraser, W. [illegible] E. Eke, G. Gibbs, W. Parsons, G. Robinson.

GLASGOW.—*1st Class:* J. MacIver, A. Stewart. *2nd Class:* [illegible]

WEST HARTLEPOOL [illegible]

SOUTHAMPTON [illegible]

LEITH [illegible]

PLYMOUTH [illegible]

LIVERPOOL.—*1st Class:* T. Brown, G. Stott, G. Webb. *2nd Class:* W. Ellis, D. Foden, A. Forrester, T. Peake, W. [illegible]

CARDIFF [illegible]

NORTH SHIELDS.—*1st Class:* E. Weatherill [illegible] Shields, W. Thompson, J. Woodrow.

MARCH 29th, 1912.—LONDON.—*1st Class:* P. Black, C. Gummer. *2nd Class:* G. Boulter, M. Bulloch, J. Richardson, F. Stephens.

NORTH SHIELDS [illegible] Shipp, J. Smith.

HULL [illegible]

ABERDEEN [illegible]

LIVERPOOL [illegible] J. Donaldson, L. Farnon, H. Hughes, W. Jarvis, F. Priestley, O. Pritchard.

BRISTOL.—*2nd Class:* F. Halse, C. Parfitt, D. Walsh.

LONDONDERRY.—*2nd Class:* W. Ryan.

SUNDERLAND.—*1st Class:* E. Morton, H. Walker.

GREENOCK [illegible] McLarty.

APRIL 4th, 1912.—LONDON.—*1st Class:* P. McGeorge, I. Plimmer, C. Young. *2nd Class:* J. London, C. Macdonald.

LEITH.—*1st Class:* J. Dryburgh, A. McAuley, W. Symon. [illegible] Thorburn.

CARDIFF.—*1st Class:* H. Cousins, W. Lumley, W. Mackon. [illegible]

BELFAST [illegible]

LIVERPOOL [illegible] Green.

GLASGOW.—*1st Class:* D. Arnott, J. Bowden, W. Loveland, J. Fleming, J. McGregor, J. Martin, W. Murray, R. Watson. *2nd Class:* D. McVicar, C. Pigott, W. Stevenson, A. Taylor.

SOUTHAMPTON [illegible] R. Gascoyne, V. Laycock, L. Love, E. Mason.

NORTH SHIELDS [illegible] C. Kaye, F. Robinson, K. Swinbanks, R. Walker.

APRIL 11th, 1912.—LONDON.—*1st Class:* A. Jordan, D. Strang. *2nd Class:* D. Campbell, F. Quested, J. Richardson.

HULL [illegible]

GREENOCK.—*1st Class:* G. Gibson, T. Henderson, W. Lovell, J. Millar, T. Niven.

DUNDEE [illegible]

LIVERPOOL [illegible] McCullagh, W. Railton.

NORTH SHIELDS [illegible]

DUBLIN [illegible]

APRIL 18th, 1912. LONDON [illegible]

SOUTHAMPTON [illegible]

WEST HARTLEPOOL [illegible]

GLASGOW.—*1st Class:* D. J. Bell, E. H. Learon, R. Gray, P. F. Munn, W. Stott. *2nd Class:* G. V. Dunbar, J. Hogg, W. S. Smart.

NORTH SHIELDS.—*2nd Class:* W. M. Alcock.

LIVERPOOL.—*1st Class:* R. E. Allen, L. Marshall. *2nd Class:* E. Cooper, H. G. Owen, P. Pye.

PLYMOUTH.—*1st Class:* N. L. Wright.

LEITH.—*1st Class:* J. R. Tait, W. Wilson. *2nd Class:* M. Dallas, W. A. Millar, J. Thomson, A. Wood.

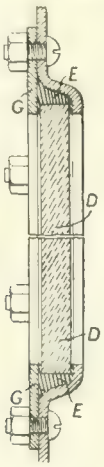
CARDIFF.—*1st Class:* H. Griffiths. *2nd Class:* A. E. J. Cooper, J. W. Davies, A. W. H. Phelps.

BARROW.—*1st Class:* H. Martindale, T. H. Vickers.

The Marine Engineer and Naval Architect Patent Record.

Compiled by Messrs. E. P. Alexander & Son, Chartered Patent Agents, 306, High Holborn, London, W.C.

27,746. Cabin and Deck Lights.—In order to secure ships' scuttle lights in the plating, the aperture has its edges upset to an amount commensurate with the thickness of the glass,



and then flanged parallel to the face of the plate. The glass D is then placed in the recess so made, and secured by the packing E and the ring G as shown.

27,851. Cargo Battens.—Comprises means for attaching cargo battens to the frames of ships built on the longitudinal

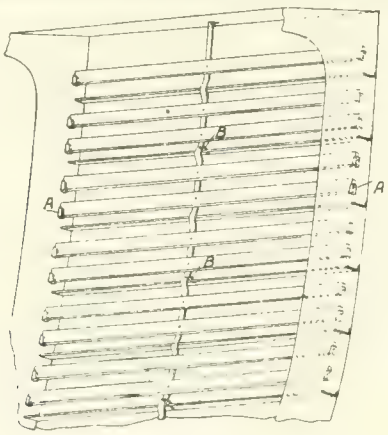
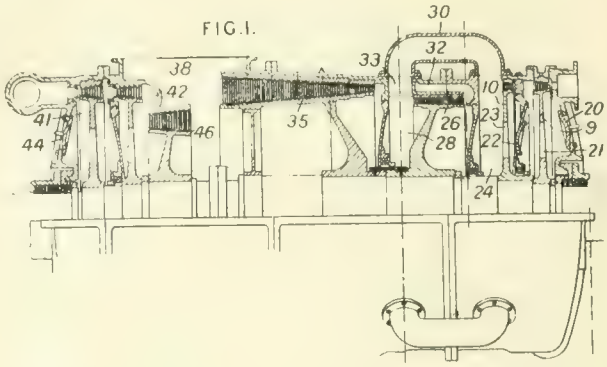


FIG. 1.

system. The battens are dropped into sockets A attached to the transverse frames, and bear against an iron strip which rests on the frames as shown, and is secured by hook bolts B. Several forms of hook-bolts are described, some adapted to pass through a hole in the frame, and others to grip the bulb or flange of the frames.

28,599. Turbines.—A marine turbine is provided with reversed drum stages so that the resultant end thrust balances the propeller thrust. For forward driving, steam passes successively through impulse stages 9, 10, the shaft being reduced on the right-hand side of the former, whereby a left-hand thrust is obtained, and afterwards passes through pipes 30 external to the casing to the left hand side of a drum stage 26, which it traverses from left to right. The action of the steam on this stage produces a right hand thrust. The steam then passes into an annular chamber 32,

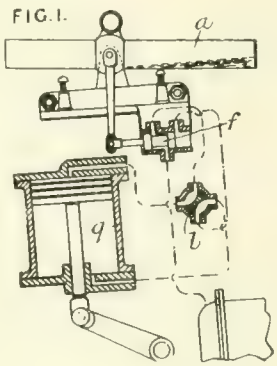
FIG. 1.



whence it is led through pipes 33 to a second drum stage 35, which it traverses from right to left and passes thence to the exhaust 38. The action of the steam on this stage produces a left-hand thrust. The various stages are so designed that the resultant end thrust balances the propeller thrust. For reverse running, wheel stages 41, 42, and a drum stage 46 are provided. To facilitate the removal and repair of the diaphragm packings, man-holes 20, 22 and 44 are provided, and holes 21, 23 are provided in the running wheels. The spaces 24, 28, can be entered by removing one of the pipes 30.

29,078. Governors.—A tiltable tube *a*, containing mercury and adjustable for "head" and "stern" seas, forms a gravity-controlled governor, and acts on the marine-engine throttle valve through a fluid-relay cylinder *q*, in which the

FIG. 1.



atmosphere forms the pressure fluid; the tilting tube acts on a distributing valve *f*, which connects one end or other of the relay cylinder to the condenser or an exhauster. A two-way cock *l* reverses the connections between the relay cylinder and valve *f* for "head" and "stern" seas.

The Marine Engineer

And Naval Architect.

LONDON, JUNE, 1912.

PROPOSED MEMORIALS TO THE "TITANIC" ENGINEERING STAFF

IT has been deemed fitting the occasion, by correspondents from various parts of the country and abroad, that the members of the engineering staff of the *Titanic*, not one of whom survived the loss of the steamer, should be memorised in some suitable way, and when time admits of the expressions of opinion from more distant quarters of the world, there is no doubt that the desire will be strengthened in volume and be brought nearer fruition in consequence. We heartily commend to our readers a favourable consideration of the proposed memorial fund, which has been steadily gathering day by day, in the hands of The Institute of Marine Engineers. One of our correspondents has suggested that a Memorial Orphan Home, specially for orphans of marine engineers, would be appropriate, and of a lasting as well as of a beneficent nature. Other suggestions are favourable to the erection of memorials of a less utilitarian character, on the ground that the benevolent fund gathered on behalf of the sufferers by the disaster has been so liberally subscribed to that most, if not all, will be placed in positions financially above the necessity of appealing to orphanages and homes for themselves or their immediate dependents. While this may be so, we incline to the view that a Home for Orphans and a Help for Widows of Marine Engineers, if such could be attained, would prove an excellent memorial to commemorate those whose loss we mourn, and it would be an undoubted boon to many in years to come. We know of cases brought to our notice from time to time that many marine engineers are cut off in the midst of their days, leaving widows and little ones not only to mourn, but to long for help in their hour of need. It is within our recollection that steamers have been lost and most of the passengers and crew saved—except the engineers; others have gone from the face of the deep leaving no record of the causes leading to their disappearance; still others have been lost while battling with the winds and the waves, or from one or other of the many dangers to which the seafarer is exposed. With all these cases arising before us, and the special claim which the dependents of the marine engineer has upon us, it does appear that while our hearts and minds are full of the subject of a suitable memorial to those to whose memories and deeds we desire to do lasting honour, a large enough fund might be gathered to endow a Home such as has been indicated. In any case, the memorial is commended to the attention of all.

THE MOTOR SHIP ENGINE

ALTHOUGH the development of the internal combustion engine for marine purposes has been going on apace for the last year or so, it is evident that the dislocation of trade, consequent on the recent coal strike, is responsible for the forward movement that has been taking place among those whose interests were so largely affected by the shortage of coal fuel. It is not surprising if commercial people should look round critically, under such circumstances, for some practical means by which important business concerns can be kept going without serious inconvenience and expense, in the event of labour trouble, relative to the production of a commodity which is an absolute essential in present day commerce. Oil is a fuel which is forthcoming from so many places in the world, and at the present time in such quantities, that it is inconceivable, in the event of local labour trouble, that dislocation could take place as has occurred during the coal strike. Such being the case, one may expect considerable development in the future, and we desire to draw attention to some of the points which appear to materially affect marine engineers in the change, that is certain to be of a very marked character, in their duties and qualifications, and which must be appreciated by them if they are to maintain the position they occupy with reference to the steam engine. In the first place, their duties, both with regard to the human factor, as well as the mechanical factor, will be distinctly more pleasant, clean and comfortable. For instance, the stoker and trimmer and all troubles connected therewith will be largely avoided, and the dirt, high temperature and general discomfort associated with marine boilers will be entirely dispensed with. Again, the fact that there will be very few pipes and such devices under pressure will materially reduce the attendance and inspection, but in addition the surrounding circumstances will be much safer. It is common knowledge that a large number of fatal and other accidents take place in steamships from the collapse of furnaces and the bursting of steampipes, and it will be recognised that this danger will be practically eliminated altogether. Anyone who has had experience with a petrol-driven motor car and a steam car, knows full well the difficulties attendant on an apparatus running under high steam pressure compared with the petrol engine, which runs as far as its pipes and connections are concerned under the ordinary atmospheric pressure. When one comes to the question of lubrication the matter is even simpler still, as the whole process is an automatic one, and the one subject for attention is to keep up the supply of oil for automatic distribution, which can be done by a pipe [illegible], and the [illegible] will be entirely avoided. The adaptability of the internal combustion engine for use at short notice and

at full power immediately, compares most favourably with hours of preparation, both as to boilers and engines, which must always take place before the steam engine can be got under way. The actual attendance of the engineer on the starting platform will not now be so necessary, as the governing of the engines is sufficiently good as to be quite reliable in bad weather. The difficulties as to the blocking up of the strums of the bilge pumps will belong to the past, as one knows from actual experience that the usual cause is the pressure of coal and ashes in the bilges and by the way, this unusually filthy region in a steamship would not exist in an oilship, because the lubrication oil is so contained by the engine casing as not to penetrate the bilge as in a steamship. The question of overhaul and repairs is much simplified, as each cylinder and attendant mechanism is a separate and independent motive element and can be dealt with, even when the other parts of the engine are left in actual work. The taking in of fuel is not only an extremely simple operation, but one which can be carried out without dirt and at a very rapid rate. The personal attendance of an engineer on board in port to look after boilers under banked fires will be entirely avoided, in fact, no engineers need be on watch except when the engines are to be run, or are actually running. From these changed conditions it is clear that the number of engineers will be reduced as compared with a steamship, their qualifications will be different, and it will be necessary for marine engineers to acquaint themselves fully as to the special matters relating to the new type of motive power, if they do not desire to find themselves supplanted by men specially trained by the engine manufacturers, as it is certain that similar arrangements will be made by those whose business it is to manufacture marine oil engines, *viz.*, to train men to run the engines they sell, as has occurred with reference to shore plants of similar type. It is not unreasonable to assume that the knowledge and ability required being something in advance of what has been previously necessary and the responsibility being greater owing to the smaller number of men carried, the remuneration of the engineers should be increased compared with the pay that now obtains.

THE SOCIETY OF ENGINEERS (INCORPORATED).—The third annual dinner of the Society of Engineers (Incorporated) was held at the Criterion Restaurant on Saturday, May 11th, 1912, Mr. John Kennedy, the President, being in the chair. The loyal toasts, proposed by the President, having been honoured, Sir David Gill proposed "The Society" in a felicitous speech, to which the Vice-president responded. The toast of "The Ladies" was proposed by Mr. J. W. Wilson, and acknowledged by Miss Siemens in a very creditable maiden speech, an innovation which was much appreciated. Coffee was served at small tables in an adjoining room during the performance of an excellent programme of music directed by Mr. Charles Capper, which formed a fitting conclusion to a very enjoyable evening.

OIL ENGINE DESIGN.

AT a meeting of the Institution of Engineers and Shipbuilders in Scotland, Mr. D. M. Shannon read a paper on "Some Aspects of Diesel Engine Design."

In the course of his remarks Mr. Shannon gave the following notes and suggestions relating to marine requirements, having reference principally to two-cycle engines.

The use of the stepped piston engine is not advisable for marine work, chiefly on account of the amount of gear that has to be dismantled before a piston can be examined. In all designs this means the removal of a cylinder, and in some, the cam shaft and gear extending over two cylinders, in addition. The advantages claimed for the design are that balancing is much easier and better, and that if the scavenging part for one cylinder breaks down it only affects the working of that cylinder. The latter reason is quite sound, but with regard to balancing, any addition of weight to the reciprocating masses is bad, and aggravates any unbalanced forces and couples there may be in the engine. In some engines, such as the four-cylinder type with cranks at 90°, it is desirable to have an additional crank, since this can be arranged to give a good balance without disturbing the equal phase difference of the working cranks. It also makes a cheaper engine to have a separate scavenging crank, although the cylinders do not all receive the same measured quantity of air.

Some of the stepped piston engines have only one fuel oil pump for supplying all the cylinders, and if it breaks down or gets choked up, which is by no means uncommon, the whole engine stops working. The better method is to have a separate pump for each cylinder, so designed that it can be overhauled without stopping the engine. Higher powers have been obtained from engines so arranged, because the supply of oil to the cylinders is better under control. This design possesses advantages from the standpoiut of governing which is a most important feature in marine engines. In a six-cylinder engine with one oil pump, one stroke of the pump delivers six charges of oil. Now, supposing that the governor was required to act immediately after the pump had made a delivery, it cannot affect the six charges which have gone beyond its control, and must go through the cylinders, even although the propeller may be out of the water. With six separate oil pumps delivering at intervals to suit the crank arrangement, it would have been able to act upon five of the charges, and would, consequently, be much more sensitive in its action. The oil should be withheld from the Diesel valve until it is just about to open, so that the governor has a chance to act upon it right up to the point at which it is required in the cylinder. With oil engines there is not the slightest fear of racing taking place on account of the propeller lifting out of the water, for it is possible to throw the whole load instantly off the engine, and there is no perceptible variation in speed. The usual method of starting up these engines is to admit air to all the working cylinders, and when a certain speed has been reached, to cut the air off from half the number, and turn the oil on. When this half has commenced firing, the air is shut off from the other cylinders and oil

turned on, when the whole engine will be running on oil. Instead of this method all the pumps may be dropped into gear at the same instant that the starting air is turned on, and as soon as firing has commenced the starting air should be shut off all the cylinders. By this method, as soon as the engine begins to move, the oil pumps begin delivering, which results in quicker starting, and effects a saving in starting air.

If the ship is fitted with an auxiliary set of engines, provision should be made for sending the hot water discharged from it through the cylinders of the main engine. This preliminary warming up would prevent the engine being subjected to sudden variations in temperature.

In twin-screw vessels, the gear on each cylinder need not be handed, because each cylinder is a complete unit, and there are no great structural changes such as exist in steam jobs. It is rather a convenience for a man to turn from one engine to the other and find it exactly the same. It also means less first cost, and only half the number of spare parts are necessary.

In order to increase the power for purposes of overload, or in cases of emergency, it is only necessary to create a denser atmosphere in the engine-room, by the usual forced draught appliances, the engines having first been designed to suit the increased compression pressure. With four-cycle engines this is all that is required, but with two-cycle engines the case is different, on account of the cylinders being open to the outside atmosphere during charging. The back pressure in the exhaust would require to be increased, which can be done by means of a water seal, an arrangement that permits any desired back pressure to be used. If scavenging pumps are separately driven it is not necessary to increase the atmospheric pressure in the engine-room. The speed of the pumps would be increased instead, thereby increasing the scavenging air pressure, and at the same time the back pressure on the engine would be artificially increased.

THE "TITANIC." G. A. Pratt of 21 and 23 Oxford Street Southampton has on sale some very good pictures of the *Titanic*. The pictures, which are reproductions from the original by the well known marine artist W. Fred Mitchell are 5 each picture. The pictures are in colours and the printed surface is 23 by 17 inches. The firm can supply photographs of all warships and mercantile vessels.

THE INSTITUTE OF METALS. MAY LECTURE BY SIR ALFRED EWING. On Friday May 10th the third May lecture of the Institute of Metals was delivered by Sir J. Alfred Ewing K.C.B., F.R.S., on "The inner structure of simple metals." The meeting took place at the Institution of Mechanical Engineers, Storey's Gate, Westminster, S.W., and the chair was taken by the President of the Institute of Metals, Professor W. Gowland, F.R.S., Assoc.R.S.M.

THE U.S. DREADNOUGHT "TEXAS." The United States super Dreadnought *Texas* was launched on the 18th. May the same day as the British built battle-cruiser *Australia* for the Japanese authorities. The *Texas* has a length of 573 feet, a displacement of [illegible] tons, and a speed of 21 knots. She will carry ten 14-in. guns included in her armament and is claimed to be the most powerful [illegible] yet [illegible] this calibre, but the statement [illegible] the claim of the Japanese *Kongo*. The *Texas* has [illegible] power of [illegible] developed by triple-expansion engines, installed in [illegible] to turbines as in the opinion of American naval engineers the compounding engine is the most economical and reliable for battleship practice. The cost of the *Texas* is put at £2[illegible]. She has been built by the Newport News Co. and the machinery is by Messrs. Cramp.

THE TITANIC.

IT is difficult indeed to continue the story of the *Titanic*. There is such a wealth of material, such conflicting stories on many points, and above all the fact that, as Lord Mersey's inquiry is in progress, one must to some extent treat the matter as *sub judice*. Yet, when we remember that there are some three hundred witnesses who may be called, that they are being got through at the rate of about four a day, and that the Court only sits four days a week, it will be long before the inquiry can be brought to a close, and meanwhile our readers will wish to know something of what has been taking place. We think, therefore, it will be permissible to summarise what has so far taken place. There was at first a good deal of discussion as to the parties who might be represented at the inquiry, the President being naturally desirous—whilst wishing, of course, to put no difficulties in the way of those who really ought to take part—of keeping down the number of counsel and solicitors before him. The matter now seems to have been satisfactorily arranged.

The twenty-six questions upon which the Court will be asked to afford answers include questions as to the numbers of persons of all classes carried by the ill-fated ship, and as to the numbers of the respective classes lost and saved: as to whether the ship was equipped with life-saving appliances in accordance with the requirements of the Board of Trade and navigational instruments adequate to her voyage; as to her crew and its composition; as to her boats, their capacity and drill; as to her wireless installation and its method of management; as to the vessel's track, and the instructions, if any given, to the master; as to the warnings, if any, in reference to the proximity of ice given to the ship, and the action taken after such warnings were received. Then the question of the provision of binocular glasses for the look-out men, and the desirability of search lights for big steamers are to be discussed. The actual place of collision has to be determined by the Court. This seems to be a point on which there is some difference of opinion. The length of time between the report of the iceberg from the look-out to the bridge, and the actual contact is to be measured and the various orders given are to be criticised. The Court is to pronounce upon the degree of discipline maintained after the accident, and also to go into the question of the various messages sent off by her operators, and of the erroneous reports which were circulated after the foundering. The methods of lowering the boats, the general construction of the ship, and the means of reaching the boat deck from the various quarters of the ship, are also to be reviewed; and above all, the Board of Trade regulations are to be discussed and considered with the object of seeing whether they need revision. This is indeed a wide field which has to be covered!

The evidence has shown that the contact with the ice took place at 11-40 p.m. on the Sunday night, and that previously the iceberg had been seen and reported as "straight ahead." Mr. Murdoch, the officer of the watch, had tried to avoid it by starboarding, and the vessel's head had gone some two points to port. One witness stated that in his opinion the wound commenced just foreward of the foremast, and though far

under the water line it seems to have run well above the turn of the bilge. It did not extend, according to the evidence of the stokers, as far as No. 5 section of the boilers, that section being clear of water for some time. When it did get there, the rush of water coming in rather suggests that something must have given way to admit it. The detailed stories laid before the Court abundantly carry out the original belief that the engine-room staff stuck to their work to the end, though they of all people must have known at a very early stage how hopeless was the condition of the ship. The fact that no engineers were saved speaks for itself. Amongst the firemen-witnesses there has been some suggestion as to the opening of bulkhead doors in the after-part of the ship with a view to bringing forward a large suction pipe for the purpose of assisting the work of pumping, and those who give this evidence do not say that they knew of the re-closing of these doors. On the other hand, one of the same witnesses speaks of the engine-rooms as being dry till a late period. Several witnesses again speak of the fact that the electric light was burning, at all events in the after-end of the ship, till quite the end. This seems to have been due to the way in which the emergency installation was brought into play. And no doubt the continuance of the light aided the difficult and dangerous task of lowering and loading the boats, whilst it must at the same time have increased the confidence of every one. In his able discussion of the evidence Sir William White has pointed out that the stem of the ship would be submerged before the dip of the decks would have exceeded an angle of more than seven degrees with the horizon. So small a slope would not be likely to make those who were not aware of the fact that the ship's head was in fact sinking, believe that things were as critical as they in fact were, though the people in the boats would realize the true position as soon as they got far enough away to have a general view of the ship. Thus it would probably be that the people in the boats wished to get away as quickly as they could to avoid the vortex which would be caused by the sinking, which they then knew to be inevitable, though those in the vessel itself did not realize till quite the last that the ship was doomed to so speedy an end. The evidence, indeed, shows that many of the women who remained on board ran away from those who would have seen them into the boats, because they believed it was "safer in the ship than in those cockle shells," whilst it is also probable that many passengers were drowned in their berths, having either not taken the warnings of the stewards or having turned in again believing that the alarm was exaggerated.

The evidence from the ss. *Californian* of the Leyland line shows that Mr. Groves, the third officer, who was in charge of the bridge from 8 p.m. to midnight, sighted a steamer coming up a little abaft of their starboard beam. He made out her two mast-head lights, and went down at 11-30 and reported the fact to the master. Mr. Groves believed the vessel to be a passenger steamer, though Captain Lord did not. At 11-40 Mr. Groves thought she put her lights out. He had been trying to get her with the Morse light signals, as there was no wireless available on his ship at the time, for, being amongst the ice, they had stopped their engines for the night at 10-21 p.m., and then wireless communication became impossible, as the installation was in this ship worked off the main engines. It should be observed that though later on the chief officer of the *Californian* saw a steamer with two mast-head lights, Captain Lord only apparently saw one mast-head light from the vessel. The *Californian* also saw this steamer send up some eight rockets—which seem to have been white rockets sending out stars, and not the kind of light which is used for signalling the identity of a steamer's company. Next morning at 5-50 the wireless operator was roused by the third officer, but nothing was heard. A little later they had the news from the *Mount Temple* that the *Titanic* had sunk. How far the *Californian* was from the *Titanic* at the time of her striking is a matter on which there seems to be some conflict, and though Mr. Groves is sure the vessel he saw was a passenger vessel, and though Gibson, the apprentice, thought she had a list to starboard, other witnesses from the Leyland liner were of opinion that the vessel they saw was a cargo vessel of about their own size.

The more one reads the evidence taken before the inquiry, the more impressed one is with the calmness and self-sacrifice of all departments of the *Titanic's* crew. The sea was undoubtedly calm. But that the whole of the boats were lowered from so great a height in darkness without accident by men new to the ship, many of them stewards and firemen, is wonderful indeed. The instinct of discipline seems to have permeated all classes and the sense of duty to have remained to the end.

The question of the provision of more boats and more seamen to handle them if deemed expedient is a matter relatively easily dealt with. But a far more important and difficult question is that of bulkheading. The water made its way aft from one or both of two causes. It may have come over the tops of the bulkheads as the bows were more and more submerged or it may have burst its way through, as apparently it did through that which separated No. 5 and No. 6 boiler sections. It would seem that one of the lessons of the calamity is the desirability of making the lower decks watertight so as to strictly limit the rise of the water in the holds and passenger spaces, and further the necessity of protecting the under water line above the double bottom by the provision of coal bunkers along the side of the ship instead of, as in the *Titanic*, athwart ship.

The flotation of even collapsable boats seems to leave little to be desired. For on Monday, the 13th May, four weeks and a day after the tragedy of the *Titanic*, the Company's steamship *Oceanic* picked up one of the collapsables in lat. 39·56 N. and long. 47·01 W. It still contained the remains of three persons, as well as a coat and a number of small articles. This fact shows plainly enough that its power of flotation left little to be desired. But for comfort, which in the end means the prolongation of life, whilst aid is on the way, it is certain that the collapsable is far inferior to the wooden or metal boat. It should therefore not be relied on in the future. And probably the partial decking of lifeboats and the supply to them of some motive power will be held to be desirable.

The witnesses before the inquiry and others still speak of "the explosion of the boilers" as the vessel

sank. As has been pointed out in these columns many years ago—and as Sir Frederick Bramwell subsequently pointed out in the "Times"—the boilers of sinking ships cannot explode as the water reaches them. They may collapse through the sudden condensation of the steam which they contain, and an appearance of an explosion may result from the rush of ashes and coal which are driven up the funnels by the ingress of cold water into the furnaces. What seemed like an explosion of the boilers was much more probably the bursting of bulkheads surrounding those spaces which still contained air. These would tend to give way under the increasing pressure of the surrounding water.

LETTERS TO THE EDITOR.

MODERN HEROES OF THE MARINE ENGINEERING WORLD.

To the Editor of The Marine Engineer and Naval Architect.

Dear Sir,—The evidence of the Daily Press and your own pertinent article have concentrated upon the fact that in the recent disaster, out of a trained staff of about thirty-two men (including engineers, electricians and boiler makers) not one of them has been saved, and suggesting that some public appreciation of this marked devotion to duty in the hour of need should be shown.

I am pleased to inform you that when this calamity became known a small Committee of Engineers and allied professions in Liverpool was formed, of which I was asked to act as Chairman, and it has now been decided to organize a fund on an extensive scale to erect a Memorial in some public place in Liverpool.

The Lord Mayor of Liverpool (the Right Hon. the Earl of Derby) has signified his full approval of the scheme.

The suitability of one great Memorial for the United Kingdom to be set up in Liverpool lies in the fact that this port has been from the beginning the main "gateway" of the Atlantic Trade, and most of the brave men who perished were directly associated with this neighbourhood, and in all probability nominated through the Liverpool offices.

All the offices of the London, City and Midland Bank are now prepared to receive subscriptions for this object, to be placed to the credit of the Fund at the Branch Office, 62, Castle Street, Liverpool.

The Hon. Secretary, Mr. C. Nelson, of 10 Drury Lane, and myself, will be pleased to hear from all who may be interested in the matter. Yours truly,

ARTHUR J. MAGINNIS,
M.Inst.C.E., M.Inst.Mar.E.

Chapel Chambers, N.,
34 Chapel Street, Liverpool, April 30th, 1912.

To the Editor of The Marine Engineer and Naval Architect.

Dear Sir,—Do you not think it would be a most suitable memorial to the engineers who were lost in the *Titanic* to have an orphanage erected, not only for the children of the engineers of that ill-fated vessel, but also for the orphans of other British marine engineers? We have all heard of and subscribed to the Home for Seamen's Orphans. Why not have a similar institution or cottage home specially for the orphans of marine engineers? Would this not be a great tribute and a lasting memorial to the engineering staff for which we will to express our esteem? Who can gainsay that it was mainly through their efforts that so many lives were saved? I believe that every engineer would contribute and subscribe now, and annually, this could be accomplished, and it would not only be a memorial to our fellows who went down in the *Titanic*, but also a blessing to many widows and children in years to come.

May I appeal to you to lend a hand in making it known through your home readers all over the world, and such circulation, to help us to successfully this project? Yours faithfully,

A CHIEF ENGINEER.

At sea, May 3rd, 1912.

To the Editor of The Marine Engineer and Naval Architect.

Dear Sir,—In view of the interest which has been taken in the subject of raising a fund through which to erect a suitable memorial in honour of the engineering staff of the *Titanic*, it was decided by the president and council of the Institute of Marine Engineers to carry the interest and by the kindly co-operation of the Press, including your own journal, a large number of letters, accompanied by donations in amounts varying from one shilling to sixpence, have been received. Many of these have come from local committees, and I shall extend it a little at a later date. I hope and your indulgence to be allowed to express thanks to those who have so nobly contributed to the fund. The spirit manifested by the given has been highly appreciated, and goes to prove that a high sense of duty is recognized to be an aim worthy of honour, while those who stuck to their posts in the depths, till they go overboard, deserve to be memorized by their generation. The response of correspondence embraces letters from all parts of the kingdom, literally from John o' Groats to Land's End, from Belfast to Hull, including most of the seaports and many of the inland towns and villages. I may say that on every social side those who were cut off at the post of duty by arriving the fund for the maintenance of orphans, children of marine engineers, and of the engineering staff as good to extend. The liberal response to the benevolent and long-sighted for the bereaved dependents of those who were lost with the *Titanic* is very gratifying. The memorial fund is of a personal and different character, and is quite apart from it.

JAS. ADAMSON, Hon. Secretary,
Institute of Marine Engineers.

55, Romford Road,
Stratford, E., May 4th, 1912.

To the Editor of The Marine Engineer and Naval Architect.

Sir,—The following extract from a paper "Engineering in The British Naval Engineer" in 1911 has such significance when applied to the engineers of the *Titanic*, every one of whom is remained at his post and made the ultimate and greatest sacrifice which any man can render in the fulfilment of his duty. Yours truly,

D. B. MORISON.

Hartlepool Engine Works,
Hartlepool, 22nd May, 1912.

In action the engine-room staff, closed below the protective deck, amid a dulling atmosphere, are called upon to perform duties upon which the whole utility and safety of the ship may depend. The intense nervous strain caused by the realization of the grave dangers to which they are being subjected, is unaccompanied by the inspiring excitement of battle, which so greatly enhances the human powers of endurance. Under these conditions, only discipline, cool judgment, and an intimate knowledge of the vast mass of machinery essential to the successful performance of the necessary duties. The largest target the guns which even in times of peace have been mounted in the engine-room of Her Majesty's Navy—with the phrase a needless devotion to duty, and trading upon experience, are accident, disablement, and death. As that consideration and effective aims which it is possible to suggest. Such accidents and actually even death happens in the heat of battle when the entire mechanism is strained to the utmost, and it cannot be anything short of success. Long experience shows there still at times is a great tendency to demoralization. It is at these times that the personal value of the engineer will be made apparent. He is the man who, alone and unaided under conditions and also by his skill, experience and cool judgment can minimize the consequences of an accident and initiate the method of cure. It is for what, or promises to this employment, that every officer will have to answer of his performance and have gained of need so in the establishment of an ship's personnel, based by the glory and chances of battle, as for the sake of their personal interests and consequences which will be left to two officers concerned. One of the main reasons the nation may require in the command to engineer officers commanding respond the duties of command and operation, which are vital not only to the safety and operation of the ship and her crew, but to

the highest interests of the nation which it is their purpose to defend, and who may be called upon to make the ultimate and greatest sacrifice which a man can render to his Queen and country.

MEMORIAL

TO THE

"TITANIC" ENGINEERING STAFF.

The following is quoted from the Institute of Marine Engineers' proceedings in connection with this fund:

The total contributions received to date of issue amount to £500

Owing to the large number of contributors it is impossible to name everyone, but very hearty thanks are accorded to all those who have subscribed to the Memorial Fund, and especially gratifying is it to record the sympathetic spirit which has been manifested and expressed so spontaneously from all quarters.

The *Daily Chronicle* started the fund by a donation of £5, THE MARINE ENGINEER AND NAVAL ARCHITECT, in expressing hearty sympathy with the movement, contributed £10. The undernoted steamers as they have arrived in port to date have forwarded contributions.

Barrow.	Minneapolis.
Caledonia.	Minnewaska.
Caradoc.	Moldavia.
Carpentaria.	Mooltan.
Champion.	Morayshire.
Chanda.	Norfolk.
Colonia.	Opawa.
Commonwealth.	Poona.
Crane.	Palermo.
Eden Hall.	Plassy.
Essex.	Ploussa.
Estrellano.	Rakaia.
Geelong.	Rotorua.
Glenroy.	Servian.
Golconda.	Shenandoah.
Guelph.	Somali.
India.	Soudan.
Jelunga.	Star of Scotland.
Kaikoura.	Tongariro.
Kaipara.	Trocas.
Makarini.	Tulliallan.
Mamari.	Waipara.
Mamora.	Wallaroo.
Matiana.	Walter Dammeyer.
Miltiades.	

THE WESTERN ELECTRIC CO., LTD.—On May 18th, the Institute of Marine Engineers paid a visit to the works of The Western Electric Co., Ltd., Silvertown. This Company was formed about fifteen years ago, and its operations then were devoted almost exclusively to the construction of telephone and telegraph cables. Subsequently, the manufacture of apparatus was taken up, and this part of the business has been developed to such an extent that the output is now equal to, if not more than, that of the cable department. The works extend over a total area of 4½ acres, and give employment to about 3,500 persons. The buildings are of modern design, well lighted and heated with a hot-water circulating and steam system. In addition to the usual appliances, a noticeable feature for fire protection is the automatic sprinkler arrangement fitted throughout the factory. Adequate mess-room accommodation and other arrangements show the consideration of the Company for the welfare of their workpeople. The tour of the premises was made under the guidance of Messrs. Rice, Penny, Catterson, Lovelace and Handcock, and the visitors were shown over the insulating and stranding rooms, the tool-making and repairing shops. The power plant was inspected, and other departments to which the visitors were given access were the wood-working, lacquering, electro and copper-plating, and, finally, the assembling room.

THE "TITANIC" ENGINEERS.

WE were able to publish in our May issue, through the kindness of relatives and friends of the deceased engineers, photos, accompanied by notes of their careers, of Mr. Bell, chief engineer, Mr. Farquharson, senior second, Messrs. Harrison and Hesketh, junior seconds, Mr. Dyer, senior assistant fourth, Mr. Ward, junior assistant fourth, Mr. Mackie, junior fifth, and Mr. Moyes, senior sixth. We have received further photographs and particulars of the careers of the other members of the engine room staff which we now append. All the engineers lost their lives in the disaster.

BERTIE WILSON,

SENIOR ASSISTANT SECOND ENGINEER.

Born at Waterloo, Liverpool, was in his twenty-eighth year. He was educated at the Merchant Taylors' Grammar School, Crosby, and later served his apprenticeship with Messrs. J. H. Wilson & Co., of Sandhills, Liverpool. He was four and a half years with the Leyland Line, serving as fourth and third engineer. His White Star service was as follows:—Assistant second engineer on the *Teutonic*, September, 1907; *Olympic*, assistant third engineer; *Titanic*, senior assistant second engineer. At the age of twenty-three he had obtained a chief's certificate. Mr. Wilson, who was of a very genial disposition, leaves a widow, but no children. He was the eldest son of Mr. Thos. Wilson, of Waterloo, Liverpool.

HERBERT GIFFORD HARVEY,

JUNIOR ASSISTANT SECOND ENGINEER.

Was born in Belfast on February 3rd, 1878, being the son of the late Mr. J. Thompson Harvey, of Messrs. Lawther and Harvey, shipowners, Belfast. He was educated at the Belfast Royal Academy and Portora Royal School, Enniskillen, and his apprenticeship was served in the loco. works of the old Belfast and Northern Counties Railway (now a branch of the Midland Railway). At the call for volunteers during the South African War in 1899 he was one of the first to join the 46th Company Imperial Yeomanry, with whom he was in the Lindley disaster and afterwards being attached to one of the regular regiments, he was in several engagements, gaining the Queen's medal with three clasps and King's medal with one clasp. On his return from South Africa he spent some time with the shore staff of Messrs. Harland & Wolff, Ltd., and then joined Messrs. Lawther, Latta & Co., managing owners for the Nitrate Producers Steamship Co., Ltd., serving with this company for eighteen months, and leaving their vessel, the *Juanita North*, to join the White Star Line. He was appointed assistant third engineer of the White Star Liner *Teutonic* in 1907, becoming later assistant second engineer. In the *Olympic* he was assistant third engineer, being later transferred to the *Titanic* as junior assistant second. He held a first-class certificate. Mr. Harvey was a freemason and engaged to be married.

JONATHAN SHEPHERD

JUNIOR ASSISTANT SECOND ENGINEER.

Was born on the 31st March, 1880, at Whitehaven, Cumberland. When quite young his parents moved to Blackburn, where he passed his apprenticeship days with the firm of James Davenport, of the Canal Works. From this firm he went to Messrs Howard & Bullough, Ltd., of Accrington, for a time, and later to Messrs. Hadfields, Ltd., Sheffield. Desiring to go to sea he secured a berth on a steamer belonging to Messrs. W. S. Kennaugh & Sons, Liverpool, and afterwards shipped as third engineer on the *Penrith Castle*, owned by Messrs. James Chambers & Co., Liverpool, trading to South America. He came home, secured his second-class certificate and joined the *Lowther Castle* of the same firm, trading between New York and China and Japan, during the period of the Russo-Japanese War. After securing his chief's certificate he joined the White Star Line and served on the *Adriatic*, *Teutonic*, *Olympic* and *Titanic*. He also had served in the *St. Paul*. His great ambition was to become the chief of a White Star liner. Mr. Shepherd was of a good-natured and jovial disposition and well liked by every one with whom he came in contact. He was unmarried.

BERTIE WILSON,
Senior Assistant 2nd Engineer.

HERBERT GIFFORD HARVEY,
Junior Assistant 2nd Engineer.

JONATHAN SHEPHERD,
Junior Assistant 2nd Engineer.

GEORGE FOX HOSKING,
SENIOR THIRD ENGINEER.

Mr. Hosking, eldest son of Captain Hosking, was born at Shaldon, Devonshire, and was thirty-six years old at the time of his death. At the close of his schooldays spent at the Teignmouth Grammar School, he was entered as an apprentice with the firm of Messrs. A. W. Robertson & Co., of the Royal Albert Docks, London. His sea service comprised two years in tramp steamers, two years as third engineer in the *Finistère*, owned by The Royal Mail Steam Packet Co., and one and a half years as second engineer in the *Ivelaske*. In 1902 he entered the White Star service, becoming fourth engineer of the *Titanic*, but left to enter the *Ivelaske*. Rejoining the White Star Line in August 1904, as fourth engineer of the *Baltic* he afterwards served in the *Republic* and *George*, being on the latter steamer when she grounded in the Mersey. He was transferred to the *Lanfranc* as assistant third engineer, working his way up to third engineer. His next ship was the *Olympic*, as senior third, and on the advent of the *Titanic* he was appointed to that vessel as senior third engineer. He held a first-class certificate and resided at Southampton. He leaves a widow, two boys, aged five years and two and a half years respectively, and a girl aged seven years to mourn his loss.

EDWARD C. DODD,
JUNIOR THIRD ENGINEER.

Was thirty-eight years of age and his birthplace Crewe. He received his education at the Plymouth Grammar School and served his apprenticeship with the London and North-Western Railway Company, Crewe. After the completion of his apprenticeship he entered the service of the White Star Line, being appointed sixth engineer of the *Celtic* in January 1904. He afterwards served in the *Baltic*, *Canopic* and *Suevic*. He was appointed junior engineer of the *Olympic* and later promoted to senior fourth engineer and on the advent of the *Titanic* was appointed junior third engineer. Mr. Dodd held a first-class certificate and was not married.

GEORGE FOX HOSKING,
Senior 3rd Engineer.

EDWARD C. DODD,
Junior 3rd Engineer

CHARLES HODGE,
Senior Assistant 3rd Engineer.

CHARLES HODGE,

SENIOR ASSISTANT THIRD ENGINEER.

Was twenty-nine years of age and held a second engineer's certificate. His birthplace was Devonport. He served his apprenticeship with Messrs. Davey, Sleep & Co., of Plymouth. He had been in the service of the White Star Line for five years and had served practically the whole of that period on the *Teutonic*, being appointed to that vessel as sixth engineer in July, 1907, and afterwards serving as fifth, assistant fourth, assistant third and assistant second engineer. His next appointment was to the Company's latest boat the *Titanic*. Mr. Hodge resided at Southampton and leaves a widow and two children, both girls, aged two years and six months respectively.

FRANCIS ERNEST GEORGE COY,

JUNIOR ASSISTANT THIRD ENGINEER.

Was born at Thetford, in the county Norfolk, in the year 1886, and was the only son of Mr. and Mrs. F. G. Coy, of Portsmouth. His apprenticeship days were spent in the Portsmouth Dockyard. After completing his apprenticeship he joined the White Star Line, being appointed sixth engineer in the *Oceanic* in August, 1907, and later being promoted to fifth and then assistant fourth engineer. He was transferred to the *Olympic* and later to the *Titanic*. Mr. Coy, who held a second-class certificate, resided at Southampton, and leaves a widow, but no children.

JAMES FRASER,

JUNIOR ASSISTANT THIRD ENGINEER.

Born in Aberdeen twenty-nine years ago, served his apprenticeship with Messrs. Barry, Henry & Co., Ltd., of his native town. He first went to sea in a vessel owned by Messrs. Langlands & Sons and served in their steamers for two years. He entered the White Star Line in October, 1907, being appointed sixth engineer to the *Adriatic*, and was promoted to fifth and then assistant fourth engineer in the same vessel. His next ship was the *Titanic*, his appointment being junior assistant third engineer. Mr. Fraser held a first-class certificate, was married, and leaves a widow and two young children

LEONARD HODGKINSON,

SENIOR FOURTH ENGINEER.

Was forty-six years of age and his birthplace Liverpool. His apprenticeship was served with Messrs. Hartley, Armour and Fanning, Stoke. He held a first-class certificate and had been five years in the Beaver Line and five years with Messrs. Rankin, Gilmour & Co., Ltd., his last position with the Company being as chief engineer of the *Saint Jerome* which he resigned to go into business for himself. He joined the White Star Line in May, 1905, as assistant engineer of the *Celtic*, in which vessel he afterwards served as fourth and third engineer. The *Olympic* was his next ship, and his rank assistant engineer, being afterwards promoted to fourth engineer. He was next transferred to the *Titanic* as senior fourth. Mr. Hodgkinson leaves a widow and two children.

JAS. M. SMITH,

JUNIOR FOURTH ENGINEER.

Mr. Jas. M. Smith was born in 1877, and was a son of Mr. M. P. Smith, the Knackery, Elgin. He served his apprenticeship with Messrs. J. S. Soutter, Elgin, after which he served in the Anchor Line workshop, Glasgow, and then went to sea and served in several coasting steamers. He obtained his Board of Trade certificates and joined the Union Castle Line, afterwards serving in the Red Star Line. He joined the White Star Line in 1906. He served on the *Majestic* and was transferred to the *Titanic* at Belfast while she was being fitted out. Mr. Smith has left a widow and a son. As he was well known and popular in his native town, his loss has been greatly felt by a large circle of friends, who extend to his widow and relatives much sympathy.

HENRY RYLAND DYER,

SENIOR ASSISTANT FOURTH ENGINEER.

Was born at Jhansi, in India, on December 21st, 1887. He received part of his education at the Manual School, Exeter and served his apprenticeship with Messrs. Willey & Co. He entered the White Star service in 1908, and after a short period with the shore staff at Southampton he was appointed to the *Adriatic*, in which vessel he remained for about three years. He was later transferred to the *Olympic* and then to the *Titanic*. His home was at Exeter.

A reproduction of Mr. Dyer's photograph was given in our May issue.

RENNEY WATSON DODDS,

JUNIOR ASSISTANT FOURTH ENGINEER.

Was born in Demarara, W.I., thirty years ago. His apprenticeship was served with Messrs. Buchanan & Co., Messrs. McOnie, Harvey & Co., Ltd. (now the Harvey Engineering Co., Ltd.), of Glasgow, and Messrs. Mirrlees, Watson & Co., Ltd., Glasgow, Mr. Watson being his grandfather. He had spent four years in the Royal Mail Steam Packet Co., serving

FRANCIS ERNEST GEORGE COY,
Junior Assistant 3rd Engineer.

JAMES FRASER,
Junior Assistant 3rd Engineer.

LEONARD HODGKINSON,
Senior 4th Engineer.

JAS. M. SMITH,
Junior 4th Engineer

KENNEY WATSON DODDS
Junior Assistant 4th Engineer

THOMAS HULMAN KEMP,
Extra Assistant 4th Engineer (Refrigerator).

in the *Titanic*, *Teutonic* and *Cymric*. He joined the White Star Line in October 1908 as sixth engineer of the *Teutonic*, being afterwards transferred to the *Cymric* and then to the *Laurentic*. Eventually he was transferred to the *Titanic* as junior assistant fourth engineer. Mr. Dodds was to have been married on the return of the *Titanic*. He held a second-class certificate.

THOMAS HULMAN KEMP,

EXTRA ASSISTANT FOURTH ENGINEER (REFRIGERATOR).

Was born in Southampton forty-three years ago. He served his apprenticeship in the works of the London and South-Western Railway Co., and after other appointments sailed in vessels owned by the company as second engineer. Four years were spent with the Isle of Wight Steam Packet Company and a short time on the steam yacht *White Lady*. For the past five years he had been with Messrs. Harland and Wolff, Southampton, but deciding to go to sea again he was appointed to the *Titanic*. Mr. Kemp, who held a first-class certificate, had his residence in Southampton, and leaves a widow and one daughter.

FRANK ALFRED PARSONS,

SENIOR FIFTH ENGINEER.

Born in Southampton, was twenty-seven years of age. His apprenticeship was served with the Isle of Wight Steam Packet Company, Southampton. For two years he was employed in the Union Castle Line steamers, and then joined the White Star Line, being appointed to the *Teutonic* in April 1910. He was transferred to the *Olympic* and afterwards to the *Titanic*, as senior fifth engineer. Mr. Parsons held a second-class certificate and had his residence in Southampton. He leaves a widow, but no children.

FRANK ALFRED PARSONS,
Senior 5th Engineer.

ROBERT MILLAR,
Extra 5th Engineer.

WILLIAM McELROY,
Junior 5th Engineer.

ROBERT MILLAR,

EXTRA FIFTH ENGINEER.

Was born at Alloa, Clackmannanshire, on July 7th, 1885. He received his education at the Burgh and Sunnyside Public Schools under Mr. John Ferguson. On leaving school he was apprenticed to Messrs. Archibald Jeffery & Sons, of Alloa, marine engineers, etc., where he obtained an excellent knowledge of engineering. During his apprenticeship he attended science and art classes, succeeding in taking many prizes. In 1905 he left Messrs. Jeffery with a special recommendation as a turner and went to the Argyll Motor Works, Alexandria, N.B. His next post was on the Tyne with the Wallsend Slipway and Engineering Co., Ltd., where he remained until 1907. He then went to sea in the s.s. *Johannesburg*, belonging to the Bucknall Steamship Lines, Ltd., and served in that vessel as fifth, fourth and third engineer. In 1908 he obtained his second engineer's certificate, and served in the same Company's vessel *Katoma* in that capacity. He obtained his chief's certificate in 1909. His connection with the White Star Line commenced in 1910, when he joined the *Olympic* as sixth engineer and was on board when she was rammed by the *Hawke*. He joined the *Titanic* as fifth engineer at Belfast on 26th March. Mr. Millar, who led an exemplary life, was very desirous of obtaining his extra chief's certificate and becoming a Board of Trade surveyor.

WILLIAM McREYNOLDS,

JUNIOR SIXTH ENGINEER.

Was born in the year 1890, in Belfast. After his school-days he was entered as an apprentice in the engineering works of Messrs. Harland & Wolff, Ltd. He joined the White Star Line 25th March, 1912, and left Southampton on the *Titanic* 10th April. This was his first voyage at sea. He was unmarried and had his residence in Belfast with his parents.

HENRY PHILIP CREESE,

DECK ENGINEER.

Was born at Falmouth and served his apprenticeship with Messrs. Harland & Wolff, Ltd., after which he joined the "Head Line" and sailed out of Cardiff for several years. He was also two years with the Ulster Steam Ship Co., three years with the Isle of Wight Steam Packet Co., and eighteen months on the steam yacht *Maund*. He had been about fourteen years in the employ of the owners of the White Star Line and was charge hand on the *Suevic* repairs. He had also served in the *Adriatic* and *Olympic*, from which vessel he was transferred to the *Titanic*. Mr. Creese, who was forty-four years of age, leaves a widow and two children, both girls, aged fourteen and eight years respectively. The deceased engineer held a second-class certificate and resided at Southampton.

THOMAS MILLAR,

ASSISTANT DECK ENGINEER.

Was thirty-three years of age at the time of his death. His birthplace was Carrickfergus, Co. Antrim, Ireland. His apprenticeship was served with Messrs. Harland & Wolff, Ltd. He had been employed one year by Messrs. Vickers, Ltd., Barrow, six months at Messrs. Workman, Clark & Co., Ltd., Belfast, and eight years with Messrs. Harland & Wolff, Ltd. This was his second voyage at sea. He had previously been one voyage in the *Lapland* of the Red Star Line. His wife died recently and two children are left.

PETER SLOAN,

CHIEF ELECTRICIAN.

Was thirty-one years of age. He was born in Liverpool and received his education at the Liverpool Institute and was a member of the Valkyrie Football Club. He served his apprenticeship with Messrs. C. S. Wilson & Co., of Regent Road, Bootle, and joined the White Star Line two weeks after the completion of his time with Messrs. Wilson. He was employed in a number of the White Star boats both in the Western and Mediterranean trades. During the latter employment he won the half-mile championship for swimming at Spezia—Italy v. England—and the gold medal and silver cup. He was on the *Baltic* at the time of the collision with the *Republic*, and volunteered for rescue work, for which he received a silver medal. He was next promoted chief electrician of the *Laurentic* and then to the *Olympic*, being on that vessel at the time of the collision with the cruiser *Hawke*. He leaves a widow but no children.

ALFRED SAMUEL ALLSOP,

JUNIOR ELECTRICIAN.

Age thirty-four years, was born in Manchester. His apprenticeship was served with Messrs. H. H. Hall & Co., o Liverpool after which he was employed by Messrs. Campbell and Isherwood, Ltd., Bootle, Hame Electric Company, Liverpool, and the Northern Electric Company, Liverpool. He entered the service of the White Star Line in August, 1904, being appointed assistant electrician to the *Celtic*. The *Baltic* was his next ship and he was later transferred to the *Majestic* and afterwards to the *Oceanic*. His next appointment was to the *Titanic*. Mr. Allsop had his residence in Southampton and leaves a widow and one young child.

HERBERT JUPE,

ASSISTANT ELECTRICIAN.

Age thirty-one, born in Southampton, served his apprenticeship with Messrs. Lankester & Son, Ltd., Southampton. He was appointed assistant electrician in the *Majestic* in August, 1908, and was later transferred to the *Teutonic*, then to the *Olympic* and eventually to the *Titanic*. Prior to joining the White Star Line he was employed for eighteen months by the London and South-Western Railway Co., and for three years by the Southampton Cold Storage Co. Mr. Jupe was unmarried, but leaves an aged father and mother.

ALFRED PIRRIE MIDDLETON,

ASSISTANT ELECTRICIAN.

Was born in the year 1885 at Ballisodare, Co. Sligo, Ireland. He received his principal education at the Intermediate School, Sligo, and showing at an early age a great inclination for mechanical and electrical engineering, he was placed with a firm of electrical and mechanical engineers in Glasgow, where he remained three years, attending during the time the night classes at the Glasgow Technical Institute, and later the day classes for one year. He was then taken into the works of Messrs. Telford, Grier & Mackay, Ltd., electrical engineers, of Glasgow, and later passed into their drawing office. He then returned to Ireland and did some very satisfactory work for the firm in superintending contracts. In July, 1911, he was engaged by Messrs. Harland & Wolff, Ltd., remaining with them until the August. Evincing a desire to go to sea he got himself appointed to the White Star Aberdeen Line and sailed in the *Demosthenes* on her maiden voyage to Brisbane, having charge of the engines driving the electric plant. Arriving home he went back to Messrs. Harland & Wolff and shortly after was appointed one of the electrical engineers on the *Titanic*. Mr. Middleton was most intimate with Mr. Ervine.

ALBERT GEORGE ERVINE,

ASSISTANT ELECTRICIAN.

Was born in Belfast on the 2nd August, 1893, and was consequently the youngest member of the engine-room staff on the *Titanic*. He received his education at the Belfast Royal Academy, the Methodist College and for a time studied in the Municipal Technical Institute, specializing in electricity. He spent some part of his apprenticeship period with Messrs. Coombe, Barbour & Coombe, afterwards going into a Belfast shipyard to study electrical ship work. He was engaged doing electrical work on the *Titanic* and on the Orient liner *Maloja*. He served in the *Maloja* on her maiden trip to the Mediterranean and Bombay. He entered the White Star Line immediately before the *Titanic* left Belfast. During his stay in Dublin he joined the "South Irish Horse" and was one of the best rifle shots in the regiment. He was strong and muscular and stood 6 ft. 2 in. high. The General Committee of the Y.M.C.A., Belfast, have decided to erect a brass tablet to his memory in their hall, the funds for which have been subscribed. Mr. Ervine and Mr. Middleton (his fellow assistant electrician) were most intimate companions, neither would go on the *Titanic* without the other, but both eventually deciding, they applied for appointments on the vessel ending with such a disaster.

HENRY PHILIP CRESSE,
Deck Engineer.

THOMAS MILLAR,
Assistant Deck Engineer.

PETER SLOAN,
Chief Electrician.

WILLIAM KELLY,

ASSISTANT ELECTRICIAN.

Was born in Glasgow on the 19th June, 1888. At an early age he was brought to Dublin, where he resided until a few months ago. He was educated at the Christian Brothers' Schools, Dublin, and Skerry's Commercial College, Dublin. He served three years' apprenticeship with the firm of T. E. Brunker, electrical engineers, in Dublin, up to 1910 and continued with them to the close of the year 1911. He had been charge hand for the firm on many occasions in different contracts throughout Ireland. In January, 1912, he went to Belfast and there entered the firm of Messrs. Harland & Wolff, Ltd., and was engaged on the building of the *Titanic*. He afterwards obtained the appointment as assistant electrician on the vessel. This was his first voyage at sea. He was unmarried.

GEORGE ALEXANDER CHISNALL.

SENIOR BOILERMAKER.

Was born at Greenock thirty-five years ago, and served his apprenticeship with Messrs. Napier Bros., Ltd., of Glasgow. On the completion of his apprenticeship he was appointed boilermaker of the White Star liner *Cymric*, but after being in that vessel for twelve months resigned to work ashore. He was also employed by the Fairfield Shipbuilding and Engineering Co., Ltd., Govan, and Messrs. Caird and Co., Ltd., Greenock. After leaving the latter firm he went to Liverpool and worked under Messrs. Elder Dempster and Co., Ltd. Mr. Chisnall rejoined the White Star Line in May, 1908, as boilermaker in the *Majestic*, in which vessel he served until he was appointed senior boilermaker of the *Titanic*. He resided at Southampton and leaves a widow and two young children.

ALFRED SAMUEL ALLSOP,
Junior Electrician.

HERBERT JUPE,
Assistant Electrician

ALFRED [illegible]
Assistant Electrician.

HUGH FITZPATRICK.

ASSISTANT BOILERMAKER.

Was born 1885 at Barrow-in-Furness. He served his apprenticeship with Messrs. Harland & Wolff, Ltd., Belfast, and joined the White Star Line in 1905, being appointed boilermaker to the *Britic*. He also served in the *Romanic*, being afterwards transferred to the *Titanic*. He leaves a widow.

ARTHUR J. ROUS.

PLUMBER.

Was twenty-six years of age and his birthplace Southampton. After completing his apprenticeship he worked for Messrs. Harland & Wolff, Ltd., and Messrs. John I. Thornycroft & Co., Ltd., both at Southampton, for about four years. He was appointed plumber on the *Adriatic* in May, 1911, and later transferred to the *Olympic* and eventually to the *Titanic*. He was unmarried and had his home at Southampton.

WILLIAM LUKE DUFFY,

CHIEF ENGINEER'S CLERK (WRITER).

Was born at Castlebar, Ireland, in the year 1883, the son of John de Lacy Duffy, civil engineer. He received his education at St. Jarlath's College, Tuam, Ireland, and at the completion of his school days spent two years as a clerk in Shackleton's Flour Milling Co., Dublin, which firm he left to take up an appointment with Messrs. Pearson & Co., Dublin. He was afterwards with Messrs. James Walker & Co., Dublin. This was his first voyage at sea. Mr. Duffy resided in Southampton and leaves a widow and one young child.

A SURVEY FOR A SITUATION AND A SITUATION FOR SURVEY.—It is much to be deplored that advantage has been taken in some quarters to make use of the recent disasters by sea for the purpose of what is popularly termed "axe grinding," but which may be more appropriately called, in this instance, "saw sharpening," and that with a very bad rasp. Apart altogether from the inventors and patentees who have been endeavouring to prove that their particular patents have solved the difficulties bearing on the safety of wayfarers on the sea, there are less desirable intruders upon the scene without the courtesy, even though it be accompanied with the persistency, of the legitimate trader. Attacks have been made upon engineer-surveyors and the way they carry on their duties. Aspersions of a venomous character have also been cast upon the nautical surveyors and the chief shipwright surveyor, all quite uncalled for. These attacks have been characterized by a culpable ignorance on the part of those instigating them and are, to the onlooker, of a form of stroke which, viewed from even a low standard, is hitting below the belt, and if one may judge the critics as representative of the class to which they belong, there is very great need of not only technical training required, but of moral stamina, accompanied by wholesome physical drill, such as that administered to the one guilty of gross caddishness by his fellows at school. In our experience—and it covers a period of over twenty-five years—the engineer-surveyors are faithful in the discharge of their duties, ready to discuss matters where there is room for difference of view or opinion as to the method of dealing with details, and determining the issue from a common-sense standpoint. The policy of being just and honest with a surveyor is undoubtedly the fairest and the best, and the ship owners' representative who attempts to deceive or hide is unworthy of his position, besides adding to the aggravations which sometimes render the surveyor's duties peculiarly unsavoury. The work allotted to the engineer-surveyors has been increasing year by year, due to the natural growth of steamers, their equipment, and the many appliances added for economy and efficiency; thus is the duty of the surveyor enhanced. It is surprising that in the supposed interests of a small-minded section of a community or a department, a snake in the grass, which ought to be consigned to the mud heap, should be allowed to spit venom towards members of the same community or department, under the auspices of any estate of the realm. No sensible practical man can be deceived by the appearance of the venom, but it is calculated to deceive the unwary unless they safeguard themselves by a study of the situation. No good end can be served by the publication of articles or letters which are of a type indicative of a low-class discourtesy, especially when these also lack the grace of truth and justice as between man and man.

THE FLEETS OF THE MAIL LINES.

(*From our Own Correspondent.*)

IF, as the more superstitious amongst sailormen are wont to believe, misfortunes always come in threes, the P. & O. Company are to be congratulated on the fact that the accident which has followed on the stranding of the *Delhi* and the sinking of the *Oceana* has been nothing worse than the fire aboard the *Malta*. For the *Malta* is one of their older and smaller cargo steamers. Built in 1895 at Greenock by Messrs. Caird & Co., she is a single-screw steamer of just over 6,000 tons gross register. She is insured on a valuation of some £36,000. She was, at the time of the outbreak, lying in the Royal Albert Dock, getting ready for her sailing on the 18th May to the Far Eastern ports, when, at half-past twelve on the 15th May, a fire broke out in one of her midship bunkers and, spreading rapidly, soon involved other bunkers and one of her holds. Outside assistance was soon summoned, steam and motor floats coming to the rescue, and, eventually, a little before six o'clock, the fire was extinguished. No. 3 hold, which was that principally affected, contained a somewhat combustible cargo, including paper and wood. So after the crew had succeeded in closing the bulkhead doors, large quantities of water were pumped in and eventually the compartment was flooded to a depth of 20 ft. No. 4 hold was also involved, but not to the same extent.

An Unsatisfactory Reply

has been returned in the House of Commons by Sir Edward Grey to a question put by Mr. Peto in regard to the case of the Hoult liner *Benhead*, which, it may be remembered, was detained for a long time at Sulina because the master refused to sign clean bills of lading for a cargo of grain which he had reason to believe was in a dangerous condition on account of incipient heating. Before the steamer could be got away £4,000 had to be deposited with the authorities to meet possible claims in the Courts, and even then there were great delays and all sorts of petty annoyances and interferences. The master's protests resulted in a sentence against him of twenty-five days' imprisonment for "using insulting language" to the authorities. Against this sentence he appealed, and had to travel all the way to Roumania to support his case. This he did and came off successfully enough. But of course he was put to great expense both for legal costs and for travelling expenses. There is, however, no redress for him or apparently for the owners, since, in the opinion of Sir Edward Grey, "the entire proceedings connected with the case have been carried out in strict accordance with the law of Roumania." That may be. But if we had had a strong man at the Foreign Office he would have taken such measures in the early stages of the business as would have let the Roumanian authorities realize that it was inexpedient to treat British subjects "in entire accordance with the law of Roumania," such as it is.

ALBERT GEORGE ELVINE,
Assistant Electrician.

WILLIAM KELLY,
Assistant Electrician.

GEORGE ALEXANDER CHISNALL,
Senior Boilermaker

The Lamport and Holt Line

has not let its energies be checked by its recent reorganization. It has just completed the purchase of four important steamships. They are the *Tremont* and the *Leipoldt* purchased from Mr. E. C. Thin of Liverpool and the *Don of Airlie* and the *Don of Coombe* bought from Mr. C. Barrie of Dundee. The *Tremont* was built in [illegible] at Newcastle by Messrs. Armstrong. She is of [illegible] tons gross register and will in future be known as the [illegible]. The *Leipoldt* is a sistership to the *Tremont* and came from the same yard in the same year. The *Don of Airlie* will in future be known as the [illegible]. She was built last year at Port Glasgow by Messrs. Russell & Co., and is of about [illegible] tons gross register. The *Don of Coombe* on the other hand is five years old and was built at Glasgow by Messrs. C. Connell and Co. Her tonnage is 4,949 tons gross. A fifth vessel of about 9,000 tons deadweight capacity, constructing on the Isherwood principle for Messrs. Jas. Chambers & Co., of Liverpool, has also been bought. This vessel is not yet launched.

The Travelling Public

may well remember the debt which it owes to the Cunard Company for its public spirit in connection with the *Titanic* disaster. Humanity, it may be said, would necessitate the hurrying to the rescue of all steamships who received the signal of the sinking liner. But the Cunard Company not only took on board the helpless survivors, but turned back with her own complement of passengers and took them on to New York. The delay and expense involved must have been serious. Now the Cunard Company have added to the obligation under which the public stands to them, by giving a month's extra pay to every member of the *Carpathia's* crew in recognition of the extra work to which they were put. A gift of this kind is not merely a recognition of service done.

HUGH FITZPATRICK,
Assistant Boilermaker

ARTHUR J. [illegible],
Plumber

WILLIAM LUND DEBRE,
Chief Engineer's Clerk (Writer).

It also serves as an encouragement to those who may in the future find themselves in a like position to do all they can to aid the helpless and the suffering, feeling sure that those who employ them will not fail to approve of and endorse their action.

Recent Disasters

to liners of the first class in the English Channel and in the Atlantic Ocean have had their effect. The President of the Board of Trade himself has made an excursion down the Thames to inspect the life-saving appliances of various passenger and emigrant steamships, so as to enable him to form some idea of actual conditions and of possible improvements, whilst most of the great Companies announce that whether the law be altered, so as to increase the obligations to carry boats or not, they will not in future send any of their ships to sea without boat accommodation for all on board. The United States Government too has thought it right to send a warship, the scout *Birmingham*, into the Atlantic, so that she may be able to warn merchant vessels of the proximity of ice. What a useful thing this would have been in the old days before steamships were fitted with wireless installations! Now, however, it seems rather a work of supererogation, for such thorough reports are made by one liner to another that the presence on the ground of another vessel will not appreciably add to the sum of knowledge. Ice this year has made its way south to an unprecedented extent, bergs being reported as far south as lat. 39·9 N., which seems to be lower than has previously been recorded, at all events for many years.

Mr. Ismay

has followed up his terrible experience by a munificent gift to seafarers, and one which carries on a family tradition. He is putting down a sum of £10,000 to which his wife is adding another £1,000, to inaugurate a pension fund for the benefit of the widows of poor seafarers. The pensions to be granted are not to exceed a sum of £20 in any individual case, and thus a number of poor persons will even at the outset be benefited by the new fund.

The Closing of the Dardanelles.

It was as recently as the 15th April that a London shipping paper called attention to the fact that there were only three or four British steamships then at Odessa—a state of things unprecedented since the days of the Crimean War. The scarcity of tonnage in the Black Sea was, of course, due to the recent coal strike in Britain, and that being ended, persons interested looked to a busy and prosperous time. But they were doomed to immediate disappointment. The very next day came the news that passage through the Dardanelles was being restricted by the Turkish forces in view of the approach of a hostile Italian fleet. On the 18th April the authorities formally notified that the Straits were closed. Protests were, of course, made by shipping and commercial men, and in a short time announcements as to the prompt restoration of traffic were made. But the work of clearing the fairway of the mines, which appear to have been very plentifully sown, has been a long and tedious one. It was not till the 18th May that the welcome and long-deferred announcement came—"Straits open; steamers passing out." At the time of the re-opening, no less than 210 loaded vessels were lying waiting to pass out through the Straits, whilst 118 more were anchored at Tenedos, bound for Black Sea ports. All this has caused very great trouble and has seriously checked the coal export trade from British ports.

BULKHEADS AND WATERTIGHT COMPARTMENTS.

THE President of the Board of Trade has appointed a technical committee to advise him, in the interests of safety of life at sea, with regard to the internal sub-division of vessels of all classes by watertight bulkheads and other means. The reference to the committee is to advise:—

1. As to what in their opinion would constitute efficient sub-division with regard to each of the classes of vessels included in the Rules for life-saving appliances made by the Board of Trade under Section 427 of the Merchant Shipping Act, 1894, having due regard to the nature of the service in which they are respectively engaged.

2. Whether independently of the foregoing, the Committee desire to make any recommendations with reference to the sub-division of vessels already built, or of new vessels, which would in their opinion contribute to the safety of life at sea.

The Committee is constituted as follows:—Mr. Archibald Denny, LL.D., of Messrs. William Denny & Brothers, Dumbarton, naval architect (chairman); Mr. James Bain, late superintendent engineer of the Cunard Line, engineer; Mr. H. R. Champness, M.V.O., Assistant Director of Naval Construction, Admiralty; Mr. G. B. Hunter, D.Sc., of Messrs. Swan, Hunter & Wigham Richardson, Ltd., Wallsend-on-Tyne, naval architect; Mr. Summers Hunter, of the North Eastern Marine Engineering Co., Ltd., Wallsend-on-Tyne, engineer; Mr. J. Foster King, chief surveyor of the British Corporation for the Survey and Registry of Shipping; Mr. Andrew Laing, of the Wallsend Slipway and Engineering Co., Ltd., Wallsend-on-Tyne, engineer; Mr. W. J. Luke, of Messrs. John Brown & Co., Ltd., Clydebank, naval architect; Mr. S. J. P. Thearle, D.Sc., chief ship surveyor of Lloyd's Register of British and Foreign Shipping; Mr. J. J. Welch, M.Sc., Professor of Naval Architecture, Armstrong College, Newcastle-on-Tyne.

The secretary to the Committee is Mr. Walter Carter, of the Board of Trade, 7, Whitehall Gardens, London, S.W., to whom any communications relating to the work of the Committee may be addressed.

WARRANT ENGINEERS R.N.R.

An Unwarranted Anomaly.

A few months ago comment was made on the very strange anomaly being created in the Navy due to recent regulations as to the position of the stoker, who after a very short course of training was to be promoted to a rank which would place him in a position superior to the fully trained and Board of Trade certificated engineer of the Mercantile Marine, who had been accepted by the Admiralty as such, under the designation R.N.R. Endeavour was made at the time to have verified or contradicted the statement made as to the position, thus apparently created, but the reply received was neither reassuring nor direct, and we were unable to place before our readers information on the point at issue. Since then steps have been taken to elicit information which is now forthcoming, and is to the following effect:—(1) Warrant Engineers R.N.R., rank with, but after, Warrant Mechanicians Royal Navy. (2) It is possible for a Warrant Engineer R.N.R. to be placed under the orders of a Commissioned Warrant Mechanician R.N.R. (3) During peace, a Warrant Engineer R.N.R. cannot obtain promotion to place him on equal rank with a promoted Warrant Mechanician. Officers of the Royal Naval Reserve who distinguish themselves in action may, however, be entered on the permanent strength of the Royal Navy, so that it would be possible in time of war for a Warrant Engineer to attain a position equal to or even superior to a Warrant Mechanician. (4) Engine Room Artificers R.N.R. have been sent to ships in which a Warrant Mechanician is borne, and this will occur in future. In such cases they come under the orders of the Warrant Mechanician.

MARINE BOILER FAILURES.

MR. J. RENEY SMITH recently read a paper before the Liverpool Engineering Society on "Further Notes on Marine Boiler Failures." He said that in a paper read before the Society in 1904 an endeavour was made to show that the great source of boiler troubles, apart from the failures due to neglect, was the distortion and alteration in form of the various parts of the boiler caused by unequal expansion and contraction. The result of longitudinal expansion was that as the front and back plates prevented an increase in the length, the furnace was compressed and the corrugations were closed, the effect being greater on the upper than on the lower part of the tube. Simultaneously there was an increase in the vertical direction with a combined result that the furnace was flattened, the flattening being greatest at the combustion chamber end where the corrugations were exposed to the greatest heat, and where, in fact, the furnace usually failed. The effect was most marked in a double-ended boiler with a combustion chamber common to two furnaces. Here the furnaces and chamber might be considered as a beam securely held at each furnace mouth. The effect of expansion in this case was distortion of the furnaces, together with a sagging effect and consequent failure of the back tube plates and saddle corners, due to the comparatively weak forms of these plates below the lower stay tubes. The inevitable bill for repairs could be materially cheapened by adopting a method of attachment for the furnace backs which would permit a renewal of a furnace at a comparatively low cost. The back of the furnace was contracted in area, the corrugation tapering off in a bottle-neck shape and being flanged outwards to join the saddle piece, which was secured to the tube plate and combustion chamber.

Many serious troubles were due entirely to the great differences of temperature between the lower third of a boiler and the upper two-thirds. In the investigation carried out by Mr. C. E. Stromeyer it was found that this difference could amount to as much as 270 deg. F., which meant that in a double-ended boiler 18 ft. long the variation in length would amount to nearly ½ in. Worked out this gave an equivalent of 13 tons per sq. in. as an extra stress to which the lower third of the boiler was subjected. The large percentage of cracked lower seams and leaky joints in this part of the boiler was undoubtedly due to this cause, and occurred more frequently in double-ended boilers.

When cracks were discovered in a comparatively new boiler cutting out and renewing seemed in most cases to be the only alternative to patching, which was a most unsatisfactory method of covering a crack, especially in places where uniformity of section was essential for the proper transmission of heat. A new system was that of welding the cracks, or rather filling the cracks with new metal brought to a welding heat by the oxy-hydrogen or oxy-acetylene method. But some difficulties were experienced in using this system, and consequently electric arc welding had made a rapid advance in favour, and was the system now generally adopted for this class of repair. In the Bernados system an ordinary electric light carbon was connected to the positive main from the generator, the metal to be heated being joined to the negative main. In manipulating the tool the carbon was touched against the metal near the part to be welded and drawn a short distance away, when the electric arc was struck and the metal quickly heated. The arc was about 4 in. to 4½ in. in length. In about twelve seconds the required temperature was produced, the arc was removed, and the weld hammered in the ordinary way. There was an objection, however, to the use of carbon, as it was found that a certain proportion combined with the welding metal, the result being that a material was produced similar to cast-iron, and therefore unsuitable for boiler work. Pommee, of Hamburg, recognising the disadvantages of carbon, experimented with the system developed by Messrs. Albrecht and Dantz. The principal feature in this method was that the iron welding pencil itself formed one pole, whilst the part of the boiler where the work was being done formed the other. An advantage was the avoidance of great heat in confined spaces, as the enormous temperature of the electric arc rapidly brought the small point on the surface being dealt with to a welding heat, the point of the iron pencil simultaneously rising to the same temperature, when a drop was deposited upon the work and combined with the metal heated to receive it. The drops followed one another in quick succession until the fracture was filled and the work completed. The objections to heating the plates over a large area were thus avoided, for although the temperature was high (about 3,500 deg. C.), it was rapidly produced and the work was finished before the heat was transmitted to any extent to the surrounding metal.

The method of dealing with local wasting of the plates was simply building up to original thickness the plate where wasted. It was necessary to remove the oxide or dirt by first chipping to bare metal and then drop by drop to add to the thickness until something over the original scantling was reached.

"AQUITANIA'S" STERN FRAMES.

THE cast-steel stern frames and brackets manufactured by the Darlington Forge Company for the Cunard Company's gigantic new liner *Aquitania*, building in the Clydebank yard of Messrs. John Brown & Co., Ltd., were safely delivered there on May 8th. It was found quite impracticable to transport the castings by railway from Darlington to Glasgow, and they were conveyed by rail to Middlesbrough and thence shipped by special steamer to Clydebank. The castings are understood to be the largest ever constructed in the annals of shipbuilding. The aggregate weight of the rudder, stern frame and bracket finally approximates to 220 tons. The stern-frame and rudder alone in completed condition weigh 130 tons, whilst the main stern post (which was cast in one piece) weighs 50 tons, the after brackets 33 tons, the forward brackets 35 tons and the rudder 70 tons. It view of the abnormal weights and dimensions great difficulty was experienced in disposing the items on waggons for the journey from Darlington to Middlesbrough, and a maximun speed of only 4 miles per hour was observed.

MARINE PROPULSION.*

IN our May issue we published *in extenso* the papers read on the 1st April before the North East Coast Institution of Engineers and Shipbuilders to introduce the discussion on the comparison of the Diesel Oil Engine, Geared Turbine and Suction Gas Engine with the Reciprocating Engine. The discussion, which was of an interesting nature, is reported below.

DISCUSSION.

Mr. Otto Frik, of Nurnberg, said that it was very interesting to hear these different papers dealing with the possibilities of ship propulsion, and he was very glad that he had had the opportunity to be present at the discussion. When in London a few days ago at the meetings of the Naval Architects, he had heard it said in connection with the *Selandia* question, that the day of the steam engine was now over. But prophecy generally, and, especially in engineering matters, was unprofitable, he considered, and that very many prophets would have encountered disappointment had they lived to the time prescribed for the fulfilment of their predictions. It might be known, the speaker said, that he was an oil engine man, from the Maschinenfabrik Augsburg-Nürnberg, which Company was very much interested in oil engines. In spite of that fact, however, he would not say that the steam engine was even nearly obsolete. He would be sorry for the good old steam if it ever became a motive power of the past; it had done such excellent service, and, he believed it would do still more, so that it was not likely to be forgotten. However, one thing was sure: the prospects for oil engines were not bad, and the progress made in oil engines for ships' propulsion in a comparatively short time, was remarkable. What the future would bring was not known; but there was one certainty, that the oil engine ought to and would conquer its field in this struggle for life. To what extent that would be—especially for the cargo vessels under discussion—was a question of price and total efficiency. After a few years there certainly would be a sufficiency of facts—not mere speculations—to see in which direction the oil engine was going, and which field would be held by steam or gas.

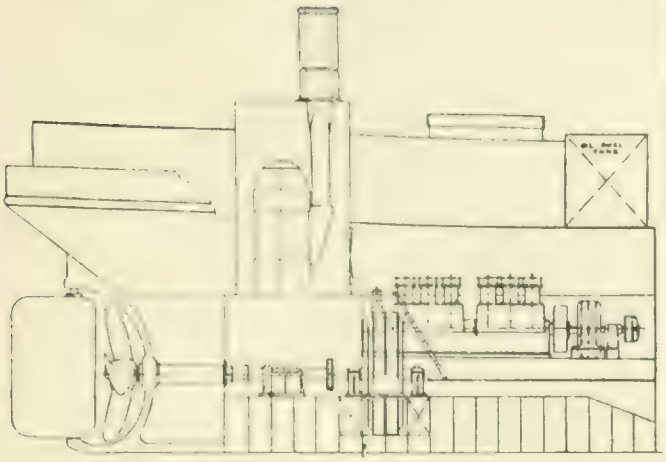
In London, Mr. Frik had heard a remark passed as to the limit of the technical possibilities of the oil engine. The limit was placed at about 2,000 H.P. per cylinder in a double-acting two-stroke type. That might be the limit fixed at the present, as nobody had tried to make a bigger cylinder until now. Of course, a number of difficulties might arise, but it was readily appreciable that such difficulties existed only to be overcome by engineers. Experience and the future alone could decide where the limit of the oil engine's possibilities would stand. Regarding the capabilities of the oil engine the speaker offered some facts which he considered might interest the meeting. Shortly before leaving Nuremberg, he had participated in some preliminary trials with a single-acting 900 H.P. engine (two-cycle). For 210 revolutions, the engine showed an oil consumption of 200 grammes per B.H.P. (·44 lb. per B.H.P.), so that ·55 lb., as stated by Mr. Orde in his paper, seemed rather too high. The Blohm & Voss Co., in Hamburg, which was studying the oil engine question in close connection with the Maschinenfabrik Augsburg-Nürnberg Co., was intending to produce next spring, two ships, one with 2 × 1,350 H.P. single-acting engines; the other with 2 × 1,000 H.P. double-acting engines. There would thus be in the near future an opportunity for comparing the double-acting with the single-acting system.

Mr. Ivar Knudsen, of Copenhagen, wrote that Mr. Orde had chosen a two-stroke engine in his paper, apparently considering this type to be the most preferable, especially from the point of view of weight and price when compared with the four-stroke engine. In his experience, and from the information which he had received from others, Mr. Knudsen could not agree with the author on this point. On occasions when the two types had been practically compared, the expense incurred in working the two-stroke had not been found to be less than for the four-stroke engine. Quite the contrary had been the result. Also, where the fitting out and the dimensions of the two types had been alike, the difference in weight of the four-stroke over the two-stroke engine, had been quite insignificant. That, of course, only held where the same materials were employed, for it would be incorrect to compare a two-stroke engine fitted with bedplate and frames of cast steel, with a four-stroke engine, having the said parts of cast iron. If, further, the weight of the fuel were taken into consideration, then of the two types in question, the four-stroke would undoubtedly have the superiority owing to its saving in fuel. Over and over again, Mr. Knudsen continued, the necessity for calculating the oil consumption figure as at least 20 per cent. higher for the two-stroke engine than for the four-stroke had been proved. Mr. Orde appeared in his paper to have appreciated this fact, reckoning, as he had, an oil consumption of ·55 English lbs., or about 12·5 tons oil during twenty-four hours. In the *Selandia*—which had been delivered to the East Asiatic Company by Mr. Knudsen's firm—in practical terms, the engine plant might be calculated to be of the same dimensions as those referred to by Mr. Orde, the oil consumption at sea, during twenty-four hours, being 9·6 and 9·8 tons, all items included save the heating of the cabins. These figures, however, could not be considered as absolutely correct, if compared with a boat such as that mentioned in the article, because in the *Selandia*, owing to the great accommodation, there was a proportionally great lighting plant, cooling machines, and extra sanitary pumps for hot and cold water. At the trials these various plants were included with their total capacity, the builders' guarantee to the owners stipulating that these parts should be included.

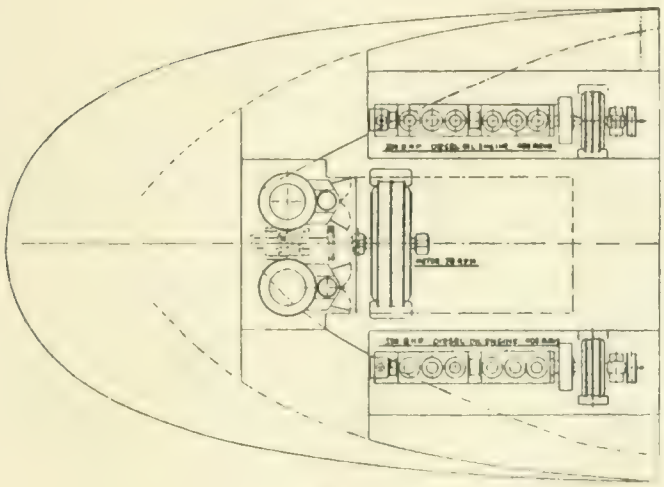
If the auxiliary machinery of the *Selandia*, Mr. Knudsen concluded, were reduced as was that of the boat in question, 10 tons oil consumption would practically never be exceeded, that figure being 20 per cent. less than the calculation for the other boat. However, these figures would cause an alteration in Mr. Orde's Table II., the quantity of oil consumed being reduced, whereas the carrying capacity was increased, Further, the cost of insurance was necessarily reduced. because that had not to be proportionately higher than the capital placed in the ship, which had been rather correctly estimated by Mr. Orde. Finally, there was no reason for taxing the item for wear and tear and deck and engine-room stores higher than with a steam engine plant, as Mr. Knudsen's firm had found that this item was at least as high for the latter plant. When all these considerations were reviewed, the result would be 58d. instead of 61·4d.

Mr. John Archer wished, first of all, to congratulate Mr. Holzapfel on his very excellent paper, and also on his courage in pioneering gas installations for marine propulsion. It was true that there had been one or two others before him in the application of non-bituminous fuels, but the speaker thought in all probability Mr. Holzapfel would be the pioneer in the application of bituminous fuel. Mr. Holzapfel had brought to bear on that vast problem his many years' experience as a shipbuilder and owner, together with absolute knowledge of marine requirements, and it was not surprising, therefore, to learn that a large measure of success had attended his efforts. It might be interesting, Mr. Archer thought, to state that Mr. Holzapfel, some fourteen months ago, had built a cargo vessel of between 300 and 400 tons carrying capacity, and installed a non-bituminous suction gas plant installation aboard. The plant of that vessel consisted of:—two gas generators, two round scrubbers and driers, gas engine of 180 H.P., and a hydraulic transformer. The fuel was anthracite or coke, and was placed in bunkers overhead. The top of the gas generator and the bottom of the bunker was connected by a hopper, and a specially designed self-feeding valve, whereby the generator could be charged without any stoking or manipulation of the fuel by hand. Thus there was a substantial saving there alone, and labour which had sometimes proved troublesome was dispensed with. The gas was hot as it passed from the generator, anything from 350 deg. to 380 deg. Cent. It had to be cooled before using; and was therefore passed through coke washers, where it was reduced to about 20 deg. Cent., and freed from any dust which might have been carried over from the generator. It was then passed to the engine. The man in the street, when a gas plant was spoken of, imagined something huge with large storage, but as a matter of fact, there was

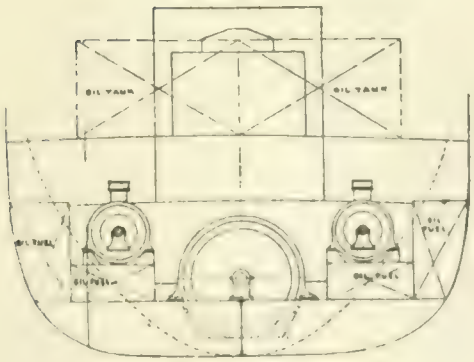
* Relative possibilities of the Diesel oil engine, geared turbine and suction gas engine as compared with the reciprocating engine for marine propulsion. A discussion introduced on the 1st April by E. L. Orde, Esq., Member, the Hon. Sir Charles A. Parsons, K.C.B., F.R.S., Vice-president, R. J. Walker, Esq., Member of Council, and A. C. Holzapfel, Esq., before the North-East Coast Institution of Engineers and Shipbuilders, Newcastle-upon-Tyne.



Sectional Elevation



Plan



Section looking aft

Fig. 1

See Mr. Mavor's remarks on Marine Propulsion—also the following illustrations.

no storage of gas in these installations. It was quite unnecessary. A few seconds only elapsed from the gas being made to its being used, and as there was only a few cubic feet of gas in the connecting pipes and vessels, it would be seen that the chances of an explosion were very remote, and even if such an event did happen it would only be a "kick," and the damage trifling, if any. These "kicks" did occur sometimes from various causes, and the point was immediately to set about discovering the cause and having the joint or whatever it might be made good. Whether the gas was under pressure or suction it would never reach more than 6 to 10 inches W.G. It would, therefore, be seen that **the jointing of pipes and connections was a comparatively** simple matter, and not as in the case of a steam installation, where the steam was **under very high pressure. Further,** any pipework between the vessels was so arranged that any breathing or movement in the shell of the ship could be accommodated. The fuel consumption, when under ordinary working conditions, was easily under 1 lb. per I.H.P. per hour, a saving of at least half the weight of coal for a corresponding steam plant.

Another advantage to which he desired to draw attention was the response of the gas to the load. Assumed that the generator was lit up and got into condition, and the engine started, full load could be put on immediately; the response was practically instantaneous. Or, again, supposing the ship was lying in port for two or three days with the generators damped down, within ten minutes or a quarter of an hour the engine might be put on full load and ready for going to sea. The same could hardly be said of a steam plant. The stand-by losses were about 14 lbs. per day of twenty-four hours, which he thought would be agreed was very reasonable. **He had Mr. Holzapfel's authority for stating that the ship** referred to had made about thirteen voyages, and that each **trip had been very successful from a financial point of view.**

Regarding a bituminous coal installation, although it was the most desirable type, it was a slightly different proposition to a non-bituminous type, from the fact that the gas had to be cleaned of its tar. It was essential that the gas should be as clean as possible, otherwise there was likely to be trouble with the engine valves. It had been found that when gas **was cleaned to ·1 gms. per cubic metre the engines worked quite satisfactorily for nearly any length of time. There had been many inventions for extracting tar from gas. It** had been found, however, from experiments and many years' experience, that a centrifugal extractor was the most reliable. The Power Gas Corporation had many hundreds in use, giving complete satisfaction. The apparatus was similar to a **centrifugal pump, except that the impeller was specially designed and the small amount of water used was introduced** in a special way. This apparatus possesses the merit of **being very simple in construction and reliable in use.**

Speaking of clinker, Mr. Archer remarked that all bituminous fuels would produce clinker when gasified in a producer, because it was requisite to have a temperature of not less than 800 to 1,200 deg. Cent. for the necessary reactions to take place, and to obtain a good and continuous quality of gas. Provided it did not reach above a certain amount there was no trouble, and the producer was quite easy to work, for as a rule the clinker was soft and readily removed from the producer walls. Of course some fuel produced clinker much more plentifully than others, whatever **the temperature of the blast, except under ammonia recovery conditions, when the clinker was exceedingly small in amount** as a rule. Various substances for lining producers had been tried, but a good class of fire-brick with close joints was found to be very satisfactory and lasted for several years. There were various ways of reducing the amount of clinker, such as the employment of a high-heat temperature, or a double **shell producer, with comparatively thin brickwork so as to** equalize the temperature as much as possible at each side of the lining. A good deal also depended upon the manner **in which the saturated blast was applied in the producer.** On the other hand, all fuels would not stand the high heat temperature in a gas producer. It seemed to him, therefore, that if the producer was to qualify any class of fuel it would **probably result in having a double shell. It occurred to him,** therefore, that there was a great future for bituminous gas-power installations on board ship, owing to the ease of working, the economy in fuel and the tremendous initial cost, its response to fluctuation in load and other advantages which

do not obtain with steam plants. He thought he ought to mention that the producers on a ship of this class would be arranged for continuous working; that meant to say, they need not be drawn, as in a suction producer, once every two weeks. There was no reason why they should not be continuous. They had producers at work on this design that had not been drawn since they were put into use ten to fifteen years ago.

Mr. H. A. Mavor, Glasgow, said the three schemes under discussion were of special interest from many points of view. It might be profitable to consider in what respects they fell short of complete solution of the problems of marine propulsion. The case which had been chosen was in many ways favourable to all three systems, but there was in each room for elimination of unsolved elements in the problem. These unsolved elements were: (1) means of combination of two or more separate power units for the operation of one or more propellers so as to give good economy at all speeds by stoppage of plant not required; (2) means of rapid manœuvring at all speeds and powers, without complication of reversing arrangements; (3) complete adaptation in extreme cases of low-speed propeller and high-speed prime mover; (4) means of distant control of the power. He had to claim that the electrical transmission solved each and all of these problems. He would say with regard to the Diesel proposition that, by using electrical transmission, the higher efficiency of the four-cycle engine without the complication of reversing gear was made available. To the saving in cost and weight of the engine on account of the higher speed (which would be about double what was proposed) there would fall to be added the saving in cost and weight of one propeller and shafting as compared with two. Two propellers 12 feet 6 inches in diameter would be required to give the same propeller efficiency as one 18-inch screw, and there would be some loss of speed for the same thrust owing to extra resistance of bosses, etc. Two engines working on the one screw had the great attraction that a reasonable speed could be attained with one engine only, a low gear connection of the electric transmission being easily obtainable. The fuel economy was not quite so good in the electrical arrangement, but this handicap was small, and the question came to be one of balancing in each individual case the cost and advantages with and without electrical transmission. He proposed to show (see figure 1) a case where the electrical combination won. That case was a special vessel for Canadian Lake traffic, and was now being built in Newcastle with electrical transmission. It was being built by the builders of the *Toiler*, and he thought the comparison would be an extremely interesting one. His had been the pleasure of seeing the *Toiler* in Montreal, and learning what an unqualified success she was in most respects. He thought it would be agreed that it was a justifiable point to make that the builders were completing the experiment on that ship by now building one on his principle. There seemed to be a splendid field for geared turbines, the success of which was already assured. The success of that gear was a confirmation of the arguments formerly shown for electric propulsion, but so far as the present example under discussion was concerned, one might say that electrical transmission would give equal economy at full power with equal first cost and weight, and would have the advantages already indicated. The reason the comparison in that case was so simple was, that there was nothing to limit the size of the propeller and that both systems had an equal field. It was not possible to show that night a vessel where the comparison was absolutely identical, but he would show (Fig. 2) the design of a vessel which came very near it. The fact that the vessel in question had been designed on a commercial basis enabled him to compare the cost and weight of the geared and the electric schemes with perfect certainty. That vessel was not being built, the reason being that, constructed in America, the comparative cost there as compared with reciprocating engines would have been too large.

Coming now to the third paper, there were here really two novel propositions. There had not been time since the figures in the papers had been published to make a full comparative study, but so far as could be seen the position there was a combination of the two cases already discussed. The cost, weight and efficiency of the electric and the Föttinger gear were approximately the same, and they must be considered friendly rivals in a large field of work. It was possible for the electrical engineer to appreciate perhaps more fully than others the beauty of Dr. Föttinger's invention. He thought no one could fail to be charmed with the simplicity and beauty of it.

As regarded the use of gas at sea, Mr. Holzapfel's appeal for further study was fully justified by past experience and future possibilities. Mr. Mavor proceeded to show views of a little boat with a gas producer, built last year and run with some interesting results. (This vessel, the *Electric Arc*, will be found described and illustrated in the July, 1911, issue of "The Marine Engineer and Naval Architect."—Ed.). He was perfectly satisfied that the problem was one that was capable of solution, and Mr. Holzapfel and his friends would undoubtedly solve it. It seemed to him a comparatively simple problem, and one which offered great inducements to perseverance, but it was certainly not yet solved. One had only to experience the relief when the gas was taken out of the boat and the oil engine put in instead to realize that. Electric transmission would be found to be a good auxiliary to all the three new methods of dealing with the problem, as well as the perfecting of older existing means.

There was a curious point with the comparison between Sir Charles Parsons' gear and the electric gear. It would be noticed that the gear wheel was the same diameter as the propeller. That probably arose from the form of the ship, but he had never seen a case where there was any great difference between the diameter of the motor and that of the propeller. Mr. Mavor showed (Fig. 3) a picture of the *Frieda*, designed by Mr. John Reid of Glasgow and New York. This vessel was 300 feet long, 5,000 tons d.w., 12 knots speed, 3,000 turbo revolutions, 84 propeller revolutions and 1,900 s.h.p. The second picture (see fig. 1) was of the tank barge for the Lake traffic, being built by Messrs. Swan, Hunter & Wigham Richardson. She was 250 feet long, 2,500 tons d.w., 9 knots speed, 400 engine revolutions, 78 propeller revolutions, and 500 s.h.p. The boat cost a little more than a steam-driven boat, he said, but her extra cargo-carrying capacity and simplicity in handling were more than sufficient inducement. The third picture (see fig. 4) was of an alternative proposal for the equipment for a collier now being built for the United States Navy. She was 525 feet long, 12,500 tons d.w., 14 knots, 5,700 shaft h.p., and the turbo was 5,000 k.w.

Mr. Westgarth remarked that he was a builder and strong advocate of the Diesel marine engine, but he hoped the progress would not be delayed by too much hurry in the first instance; he thought it would be to the interest both of shipowners and engine builders that some of the Diesel marine engines now being built should be tried at sea before too many orders were placed. There were many practical questions to be determined which could only be done properly by sea-going experience—as, for instance, the use of sea-water for cooling cylinder jackets. There is also the question of supply of suitable fuel oil, both as to position and price.

Referring to the paper, he thought Mr. Orde's figures were conservative, both brake horse power and the quantity of oil used per horse power as stated could probably be reduced. Mr. Orde appeared to be of opinion that Diesel engines should be arranged for twin screws; no doubt this is the case for large vessels, but for ordinary marine cargo boats of moderate size the speaker considered that single screw engines would be more suitable. His firm were now building a set of single-screw Diesel engines for a 275-foot steamer to carry about 3,150 tons deadweight, being constructed by Messrs. Sir Raylton Dixon & Co., for Messrs. Furness, Withy & Co. It was at first intended to fit twin screws, but on reflection the single screw was adopted, amongst other reasons, in order that the vessel might be under the same conditions as some ten or twelve similar vessels which the same owners have at sea. In this case the single-acting two-stroke cylinder was adopted, which agreed with Mr. Orde's opinion. The engines were designed to run at only about 115 revolutions, this slow speed being fixed upon from considerations of propeller efficiency, and at that speed it was considered the ordinary open type engine would be suitable, especially as they could be more readily examined when at sea and overhauled when necessary by the ordinary men accustomed to cargo boat steam engines. It was also decided to make the engine self-contained, so that no auxiliary compressors or other machinery would have to be worked at sea, this being quite different from the arrangement on board the *Selandia*, doubtless

known to many of the members, which vessel is fitted with enclosed type fast-running twin-screw engines with separate auxiliaries, so that the main engines could not be worked at sea without the auxiliary Diesel engine being also at work. It was true that in a modern steam-driven cargo boat there are generally some auxiliaries working at sea, as, for instance, the separate feed pumps and fan engine, but these are adopted because of the special circumstances, and it is surely an advantage to dispense with the auxiliary engines running at sea as far as possible.

An important question in connection with Diesel marine engines is the method of working the deck machinery and the necessary engine-room auxiliaries, as, for instance, the stand-by compressor, the bilge pumps, etc. Compressed air and electricity are being used for this purpose in some ships, but in the speaker's opinion neither system was yet completely developed, and therefore in the case of the Diesel engines being built by his firm, it was decided to use steam for the auxiliaries as being better understood by sea-going men, and also reducing the quantity of new type machinery which the ship's staff would have to attend to.

Mr. Orde mentioned the necessity for carrying some of the fuel oil in other parts of the ship than the double bottom, because of the danger of the oil solidifying in cold weather. There was, and Mr. Westgarth, the additional consideration that if the ship were stranded the oil in the double bottom might be lost, so that a reserve fuel tank should always be supplied.

Mr. J. M. Allan remarked that those with whom the idea originated of comparing the possibilities of the several types of engines for marine propulsion were, together with the writers of the papers, deserving of the meetings hearty congratulations. To make a comparison in an intelligible manner was a very difficult business, and the adoption of a cargo ship as a standard load, in his opinion, simplified the work of the authors very much. The standard cargo ship as presented by Mr. Orde, was one with which all were familiar. A great deal was known about its workings, and the author had put forward its results in a very comprehensive way. The diagram he had exhibited was easily understood, and the tables quite explanatory. Coming to the geared turbine paper, Sir Charles Parsons had mentioned that, by use of superheated steam, a reduction could be made in the water consumption. [illegible] the triple-expansion engine for all purposes, [illegible] the geared turbine. If so, that meant a saving of [illegible] of water, or [illegible] per cent. If the figures of [illegible] per cent reduction for geared turbines be introduced into Mr. Orde's Table II. and the results placed against those of the steam engines there given, [illegible] the turbine engine would presumably be more costly than the triple-expansion one, and there would be more to pay for insurance—the items for insurance and coal would probably be about £[illegible] and £[illegible] respectively. Allowing wages, wear and tear and [illegible] to remain as before, the total in the two cases then would be £[illegible] and £[illegible]. If these totals were respectively multiplied by the number of voyages and twelve months, and the same amount allowed for depreciation and management, the same total [illegible] would be £[illegible] and the cost [illegible]. In the calculation shown by Mr. Orde, the cost was £[illegible] per annum, consequently there was only £[illegible] difference: while the triple-expansion steam engine was [illegible]. If that could be done with the geared turbine, and it meant using something with which most people were familiar, then the oil engine [illegible] necessary. Indeed, the latter, at present was really experimental on one ship [illegible] running at sea, and another ship was [illegible] on her first voyage. After these vessels had had a more lengthy test, and wear of the multiplicity of working parts began to be felt, the estimated saving might disappear, and Mr. Allan was afraid the repair bill might tend a very disappointing character.

Dr. Lottinger, Messrs. L. Hall Brown, Wm. P. Durkall, Summers Hinton, W. L. K. Lemon, of New York, W. C. Mountain, W. J. Sedgwick, A. Hartman, H. McGill and H. E. Fullagar also added valuable contributions to the discussion.

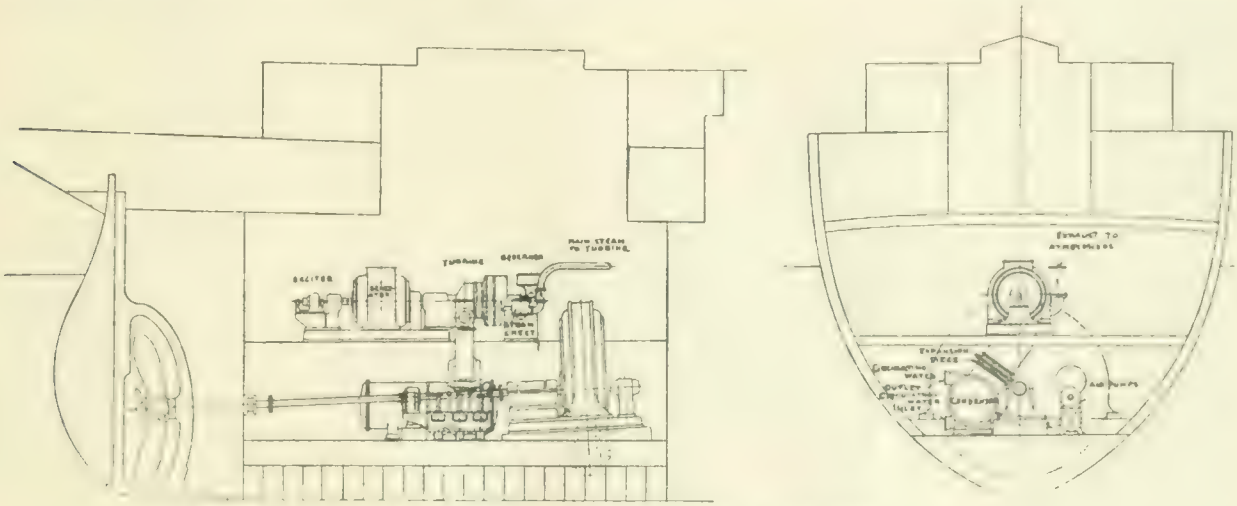


FIG. 2.—Machinery and arrangement of the *Leda*.

upon the statement of Mr. C. Zulver, the marine superintendent of the [illegible] Mr. Zulver says that Diesel motors for marine purposes have [illegible]

be any increase in the consumption; as a matter of fact, with the experience gained, this would probably be improved upon by the introduction of more suitable fuel atomisers, etc.

Mr. Orde gave the figure for consumption of the two cycle engine as 0·55 lbs. per B.H.P. per hour, which represented an increase of nearly 24 per cent. in fuel consumption as compared with the *Vulcanus'* four-cycle engines. Mr. Orde considers it doubtful whether the gain in fuel consumption could amount to 10 per cent., but from the actual results obtained with the *Vulcanus*, there would seem to be little doubt that the saving in fuel was considerably more than 10 per cent. Seeing that a change was made from the original compound steam engine to the triple-expansion, and later to the quadruple-expansion engine, to obtain respectively a gain in fuel consumption of about 12 per cent. and 8 per cent., which involved in each change the addition of a complete engine, with at least 12 per cent. increase in weight and 15 per cent. increase in first cost, it would seem very unfair to the four-cycle engine to consider the two-cycle superior only on the score of an extra 12 to 15 per cent. weight and 10 to 12 per cent. first cost, and Mr. Zulver was constrained to think that unless the consumption of the two-cycle motor could be considerably improved upon, the four-cycle will from economic and commercial standpoints prove to be better suited to the propulsion of merchant ships, quite apart from the many drawbacks there are from the technical and engineering point of view.

A few of the more serious drawbacks were—1. Double the heat generation on pistons; 2. Ports in bottom of cylinder, which makes the permanent tightness of a liner doubtful and might lead to much delay and expense in repairing in foreign ports; 3. Complication of scavenging pumps; 4. There was no relief on the moving parts, as with the four-cycle engines, necessitating larger bearing surfaces. Trouble with existing engines had been experienced by overheating of moving parts. It was to be further noted that Werkspoor, of Amsterdam, as experienced motor builders did not admit that the weight of the four-cycle engine or the price should be higher than the two-cycle. In one case, in which they had actually quoted, it was proved that their four-cycle engine was lighter than the two-cycle of other makers, and the price was less. It was certainly important to keep the first cost of a vessel as low as possible, but it was even more important for the shipowner to keep the running expenses of a vessel as low as possible, also having regard to the reliability of the engines, as repeated delays for repairs quickly ran into thousands of pounds of loss, and in both respects, especially the latter, the four-cycle engine was, in his opinion, up to the present state of development of internal combustion engines, more reliable than the two-cycle, and to be preferred otherwise. That a point was soon reached where the saving due to the lower fuel consumption was balanced by the extra first cost and less cargo carrying capacity by increased weight of engines was rather doubtful, and the results obtained with the *Vulcanus* easily proved that from the commercial point of view, the four-cycle appears to be the more economical so far.

The figures for the ship under discussion for the four-cycle engines, assuming that Mr. Orde's figures as regards extra cost and weight for the two-cycle engine were correct—which is still open to some doubt, would be as follows:—

Dead weight due to increased weight of engines, 40 tons, less freight per year, 16 voyages at £1	£640	0	0
Extra capital charges on the basis of the first cost being 10 per cent. more for the four-cycle engine, £2500 at 15 per cent.	375	0	0
Less earning capacity	£1015	0	0
Against a saving of	2596	0	0

reduced running expenses being 15 per cent. of reduced fuel consumption.

The graphical curves of the comparative costs of working steam and Diesel ships were very interesting, but it should be observed that the price of coal at 15s. is too low as an average, and that it would still pay shipowners to use Diesel ships even if the cost of oil should reach four times the average cost of coal, as in this case there would still be the advantage of increased cargo carrying capacity; also of less bunkers and reduced running expenses by the absence of firemen, and there would be further no stand by losses for banked fires and time lost by raising steam. Mr. Orde's curve was further based on 0·55 lbs. per B.H.P. per hour, which was far too high for the four-cycle engine, and therefore the curve did not show the full advantage of the Diesel ship compared with the steamer, should the four cycle engine be adopted. The paper did not refer to the economy which may be expected from the utilization of the heat in the exhaust gases for driving the auxiliaries which were at present wasted. It was usually assumed that in the Diesel engine about one third of the heat was converted to useful power, while the other two thirds were wasted by the cooling water and the exhaust gases, each carrying away about one-third. It should be possible to recover at least some of this wasted heat and power, and if the arrangement which was now being made in the *Juno* to drive the auxiliaries with the steam raised by the exhaust gases should be successful, a further substantial saving may be confidently expected in fuel consumption, which places the Diesel ship in still more favourable comparison with the steamer.

The item for wear and tear is given as £110 for the Diesel ship and £100 for the steamer per month, which is too little for the steamer and too much for the Diesel ship. A considerable item in every ship's repair bill is cleaning and upkeep of boilers. A great advantage of the Diesel ship was the absence of boilers in connection with the delay necessary for upkeep and repairs. From the experience with the *Vulcanus*, the upkeep for a Diesel ship should not be more than £50 for the vessel under consideration, while for the steamer the item is more nearly £130 a month. The absence of boilers generally was a great point in favour of the Diesel ship, as boilers at a certain age were always liable to give trouble, while the repair bill is constantly increasing as their age advances. Mr. Zulver's general impression is that Mr. Orde has not done full justice to the Diesel ship generally as compared with the steamer and to the four-cycle engine in particular as compared with the two-cycle engine, probably because he had not access to the data of which the Anglo-Saxon Company were in possession, nor their experience of the subject.

As regards the relative possibilities of the Diesel engine, geared turbine and the suction gas engines for ships' propulsion, it would appear that everything so far points to the superiority of the Diesel engine over both the other means of propulsion. While over sixty Diesel engine ships have now been in use, and the first Diesel ship was commissioned about eight years ago, against one or two suction gas propelled and turbine geared ships, enterprising shipowners need not be in the dark as to the relative reliability and economy of these three different means of ship propulsion, and they would find that in every respect, probably, the balance would be in favour of the internal combustion engine, which had proved itself to be a more reliable and more economical prime mover both on shore and on board ship than either the suction gas engine or the geared turbine. Another very important point is that its construction was simpler, no gas producers or boilers being needed.

After Mr. Zulver's statement, Sir Marcus Samuel continued; For the proper appreciation of his reason for expressing the opinion that any comparison of ships' structure on the lines of supposed identical vessels, steam and internal combustion, was impossible, he was forcibly reminded of the introduction of the motor car, where upon its first advent designers of carriage work sought to keep as nearly as possible to the horse vehicle. A ship had to be evolved, designed quite regardless of the steamer as hitherto known. He had before him the illustration to Mr. E. L. Orde's paper on the Diesel oil engine, and reminding them of his statement that he would deal with this question as a practical shipowner, this must be his excuse for criticism upon the design of a ship by such an expert as Mr. Orde and his advisers.

There was a fundamental error; Mr. Orde had assumed that the merchant ship must necessarily be a twin-screw vessel. The *Vulcanus* was not; the *Juno*, which would be of 2,600 tons, was not, and he was profoundly convinced that future merchant ships would be single-screw too. In fact, an ingenious patent had already been taken out by Messrs. Burmeister & Wain for the single-screw ship, and instead of the enormous loss of space which struck all observers in the *Selandia*, owing to the engines being placed on the extreme sides of the ship, it had been found possible to put them—as the present marine steam engines are put—in the centre of the vessel, and by an ingenious system of coupling the two sets of engines on to the one shaft direct, to largely economise the space needed both for the tunnels and for the engine

itself leaving the space on both sides which in a steamer would be required for coal, free for carrying the cargo in the double bottom of the ship. Mr Orde [illegible] available for oil being ample for the longest voyage which would be contemplated, and being very much the necessary for any broader space proper. In the design before him Mr Orde had provided very considerable space for [illegible] which appeared to be unnecessary, because no separate boiler was needed for working cargo in port, seeing that it was intended to provide a jet of oil fuel to the one boiler to be used when the exhaust gases generated during the ship's travelling were insufficient. Much larger space in the engine room space would be required if the engines were designed of greater individual horse-power, and it appeared to him very improbable that anything approaching the space reserved for the engine in Mr. Orde's model would be actually required, and he hoped on opportunity of inspecting the *Freia* would be afforded to the engineering world, by which they would see the great advance already established in the power of the engine as compared with any ship yet afloat. Reverting to the design of the vessel shown in Mr Orde's model consideration had been given to the oil ship for the great gain of having practically clear decks, one of the greatest charms of the internal combustion engine ship was that it did away with the funnel and boiler casing, leaving a clear deck space where cargo too large to put down the holds may be safely and economically carried on deck. The vice of adhering to the steamer design for an internal combustion boat was clearly illustrated by the fact that notwithstanding that it was contemplated to fit the engine boiler for gas or alternatively for oil fuel Mr Orde had provided a funnel in order of arranging the rigging so that the arrangement took place through the most central but in the wrong place for the derricks. He refrained from further [illegible] in the design of the ship shown by Mr Orde because he felt very it would be not one consider that his [illegible] contemplated designing a ship to utilize the advantages of the internal combustion engine to the utmost had been [illegible] before them, which was instituted [illegible] for the purpose of comparison.

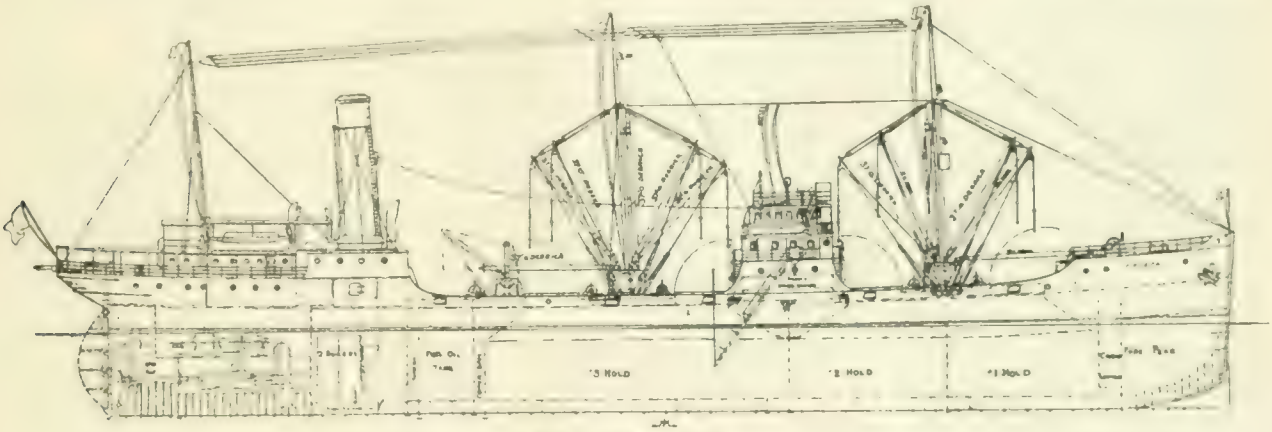


Fig 3.—The *Freia*

[(To be continued)]

THE BRITISH ENGINEERING ASSOCIATION.—Incorporated April 6th, 1912, a national organization for the promotion of British engineering interests abroad. The organization of this Association has been [illegible] by many of the best known engineering firms in Great Britain. Altogether, previous to incorporation, [illegible] firms have signified their adhesion and there are a number of other applications for adhesion. The aim of the Association is not to [illegible] any individual firm or firms [illegible] in any way but to [illegible] for the promotion on the [illegible] the interests of the British engineering industry. Its intention is to employ the great influence [illegible] in the engineering industry to [illegible] the British Government, financial organizations, shipping companies, merchants and others to promote the interests of British engineering throughout the world in the same manner as the support of our foreign competitors are promoted by their Governments and other bodies. The efforts of the Association will in the first place be directed to China. In that country, especially in view of the new *régime*, the organization and strengthening of British engineering interests are urgently needed. The technical education of Chinese engineers on British lines and in the English language will be encouraged. Britain's two strongest competitors, Germany and the United States, are making a very strong bid for the education of the Chinese engineer. The Germans with their model workshops at Tsingtao have properly organized engineering works, where young Chinese of the right class are encouraged to attend and learn thoroughly, not only the German language, but engineering and [illegible] practice, and large sums of money are expended in bringing to Germany the right class of Chinese for their engineering training. Then again, German manufacturing engineers on their own account have an association for dealing with their overseas interests, and have subscribed a large sum for the purpose of creating three purely German engineering schools in China. The Americans have gone a step farther. They waived a portion of their war indemnity against China after the Boxer rebellion on the understanding that that money should be spent in sending over the right class of Chinese to the United States for the purpose of theoretical and practical education. Every manufacturing engineer in the country [illegible] interests which are likely to be [illegible] to the [illegible] of the Association is offered an opportunity of becoming a member. A number of influential firms are [illegible] are supporting the enterprise, and anyone desiring to know more about the Association should address the Secretary at the office of the Association, Queen Anne's Chambers, Westminster, S.W.

THE MARINE MAGAZINE.—In the May issue of the *Marine Magazine*, the quarterly publication of the Marine Society (Training Ship *Worcester*), appears a long and well written account of the capture of Banda Neira a hundred years ago by the British in Eastern waters, which brought into existence the Banda Nutmeg, a splendid example of the silversmith's art now in the possession of the Society. On the question of punishment by pillory, Sir Harry Poland, K.C., writes interestingly. Another article which will appeal to those who are concerned with seafaring matters, and the training of boys for the sea, is that entitled "A trip on the *Worcester*," in which particulars are given of the scheme of training carried out on board the *Worcester* by means of Armstrong Hoswell's steering apparatus, and also of boys' life on board the *Worcester*. Many other matters appertaining to the *Worcester* and the [illegible] young seamen who are [illegible] are included in the issue. The [illegible] copies of the magazine, printed on art paper, may be obtained free of charge (4d.) from the Secretary, Marine Society, Queen's Place, Blackfriars, E.C.

NAVAL MATTERS—PAST AND PROSPECTIVE.

(From our Own Correspondent.)

Portsmouth Dockyard.

WE have had another visit from the First Lord, who spent the last week end of April here, making the Admiralty yacht *Enchantress* which was berthed alongside the dockyard, his quarters. On the Sunday morning Mr. Churchill crossed the harbour to the submarine depot at Fort Blockhouse, and inspected the new submarine depot ship *Adamant* which had arrived from the Clyde two days previously and had been commissioned. The First Lord spent the remainder of the day in visiting the dockyard, and in the evening he gave a dinner party on board the yacht. The battleship *Duke* is progressing favourably and is in as forward a condition as any of her predecessors for the corresponding period, notwithstanding the coal strike. There is no doubt that she will be ready for launching in October. The battleship *King George V.* will, at the rate she is progressing, be quite ready to hoist the pennant by January next—two years from her laying down. The battle-cruiser *Invincible* has completed an extensive refit, and has proceeded to Portland. The cruiser *Diadem* has gone to Haulbowline, where repairs to her machinery are to be carried out. Her crew navigated the cruiser *Hermione*, which has undergone a refit at the Irish yard, to this port. The battleship *Exmouth* the flagship of the Commander in Chief of the Mediterranean Fleet, which came home to give leave, has left for Malta. Except in name, and with one or two changes, the new reorganization scheme really makes no difference at Portsmouth. Rear-Admiral Moggridge, who commanded the local sub-division of the Home Fleet, will command the battle squadron of the Second Fleet, but he will continue in his old flagship, the *Zealandia*. An interesting addition has been made to the dockyard museum of an old breech-loading gun, which was dredged up in Dover Harbour last August. The gun dates from the fourteenth century and is of wrought iron, and is 4 ft. 6 in. long. Mr. L. Stansfield, assistant naval constructor at this yard, has been selected by the Admiralty to supervise the construction of the new battle-cruiser *Tiger*, which is to be built at Clydebank.

Devonport Dockyard.

The battleship *Centurion* continues to progress very satisfactorily. It has been decided to provide the vessel with bilge keels, and the work is now in hand. She will also probably be fitted with anti-rolling tanks. At the rate she is progressing there is every reason to anticipate that she will be ready for sea by January next. The displacement of the *Centurion* will be exceeded by that of her successor, the *Marlborough*, the beam of the latter vessel being so great that already the hull almost spans the entire width of the slip. The construction of the hull has been advanced up to the height of the lower armoured deck. October or November is the time anticipated for her launch. The alterations and improvements to the battle-cruiser *Lion* are making good progress and she is to be ready by June 4th for service in the First Cruiser Squadron. When completed, the *Lion* will possess the largest and longest set of funnels of any of the battle-cruisers. Improvements are being effected in connection with the fire-control fittings of the battle-cruiser *Indefatigable*, and the conning-tower fittings are also being brought up-to-date. The work of replacing the narrow centre sections of the bilge keels of the battle ship *Monarch* has been completed and the vessel has taken her place in the Home Fleet. The battleship *Conqueror* has arrived from the Clyde to be docked and to carry out her trials. The vessel is to return to the Clyde on June 17th. The refit of the cruiser *Sutlej*, which had been in hand about eight months and has cost about £70,000, has been completed. The cruisers *Warrior* and *Leviathan* have arrived for refit and the cruiser *Theseus* seagoing tender to the Gunnery School, has been paid off for repairs. The battleship *Empress of India* left on May 1st, in tow of the cruiser *Warrior*, for the Motherbank when she came into collision with a German barque, both vessels being considerably damaged. The barque was towed to Southampton and the battleship taken to Portsmouth, where she was docked. The destroyer *Bullfinch* has left for Haulbowline to be taken in hand for retubing. Engineer Captain F. Curtis, who is on the staff of the Rear-Admiral of the Home Fleet at this port, has been awarded the good service pension of £150 a year in the vacancy caused by the retirement of Engineer Captain T. Thorne. Mr. G. Rowlands has been appointed to supervise the construction of the new cruiser *Birmingham*, building at the works of Sir William Armstrong & Company.

Chatham Dockyard.

The battleship *Bulwark*, while on a full power trial after her refit, went aground twice on the Barrow Deep Sands. She buckled twelve of her plates and was in a leaky state when she returned. The plates will have to be replaced and the vessel was docked on May 8th for the work to be taken in hand. The *Bulwark* was recently refitted at a cost of £87,000. Work has been rather slack of late, and with the completion of the large engine and boiler repairs to the *Bulwark* other work was required for the hands released from that vessel. Fortunately the cruiser *Hogue* arrived on May 6th and she will provide employment for a considerable number of men. As other vessels are also arriving, it looks as if we shall be able to get along without any further reductions. The battleship *Dominion*, which has been transferred from the Second to the Third Battle Squadron, has come in for her annual refit. The refits of the battleships *Agamemnon* and *Commonwealth* have been completed and the battleships *King Edward VII.* and *Hibernia* have also had their defects made good and have left. The battleship *Triumph* has arrived from the Mediterranean and has been commissioned as tender to the *Glory*, the parent ship of a group of vessels in the Third Fleet at the Nore. There is no foundation for the report that the Admiralty contemplate utilizing the *Triumph* and her sister vessel, the *Swiftsure*, for the seagoing training of cadets in place of the cruisers *Cumberland* and *Cornwall*. The two battleships, which were purchased from Chili in 1903, have been withdrawn from the Mediterranean, in connection with the reorganization scheme. The cruiser *Pactolus*, which was taken in hand last year for conversion into a submarine depot ship, has been commissioned as depot ship of a group of submarines which is to be stationed at Lamlash. At the dockyard sale on May 14th seven obsolete destroyers were disposed of for £11,450. The *Snapper* headed the list with £1,780, and the *Havock* realized the lowest price, £1,510. There has been placed in the chapel of the Royal Naval Hospital a stained-glass window to the memory of the late Surgeon W. Archibald, who was drowned in the Medway a few months ago. The window has been erected by his brother officers, and the dedication service was performed by Archdeacon H. S. Wood, the Chaplain of the Fleet.

Sheerness Dockyard.

There are several casualties to report this month. A collision occurred in Stangate Creek on April 25th between the destroyer *Lightning* and Torpedo Boat No. 17, the latter, which was at her berth, receiving a glancing blow on the port side, while the destroyer had her stem flattened both above and below the water line. The *Lightning* arrived with a collision mat over her bows, and was floated into dock for repair. The torpedo-boat also required dry docking, the damage being chiefly below the water line. She had a collison mat over the hole, which was about 40 ft. from her bow. Seeing how the stem of the destroyer crumpled up it seems surprising that the torpedo-boat was not more seriously damaged. The explanation is that the torpedo-boat is one of the ex-coastal destroyers built a few years ago, and her plates are of high-tensile steel, while the bow of the *Lightning* is constructed of mild steel. The gunboat *Leda* has arrived for repair, her main topmast having been carried away and her wireless installation dismantled in a gale in the North Sea, where she was engaged on fishery duties. The battleship *London* arrived on May 12th and early on that morning was in collision near Dungeness with the steamship *Don Benito*, a vessel of 3,749 tons, owned by the Buenos Ayres and Pacific Railway Company. The steamer was rammed amidships, but kept afloat and was towed to Dover. "No. 4 floating dock," as it is described in the Estimates, has arrived here from the Tyne in tow of two tugs, and has been berthed at

[illegible] admiral.

Pembroke Dockyard.

[illegible]

[illegible] y for her [illegible] men will then be available for another refit, but up to the [illegible]

[illegible] ne-driven battleship-cruiser was launched by [illegible]

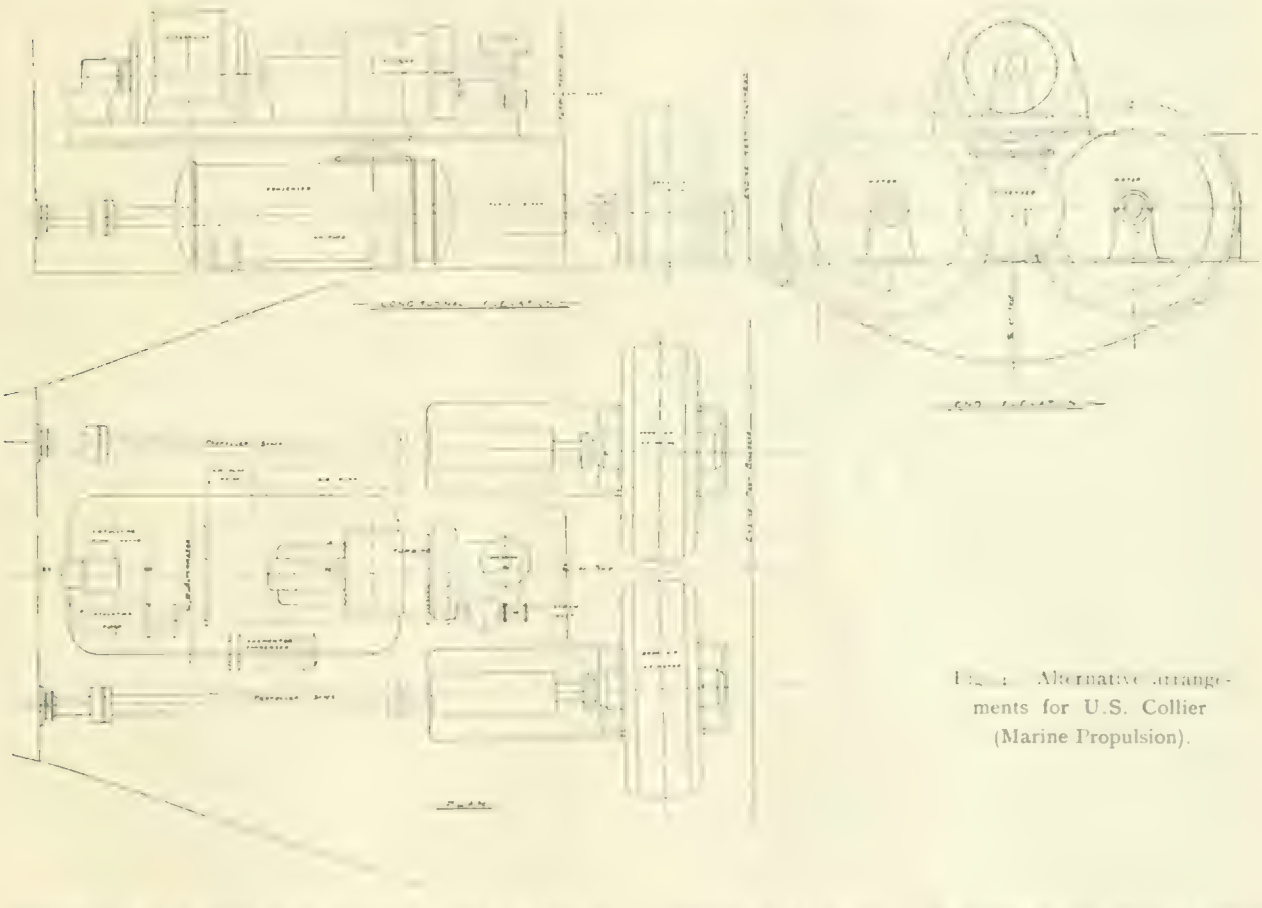


Fig. 1. Alternative arrangements for U.S. Collier (Marine Propulsion).

[illegible] team trials until Nover [illegible] with turbines which will combine the main [illegible] the Parsons and the Curtis systems. [illegible] similarly engined. We are getting interested as to when the [illegible] no additional hands can with [illegible]

[illegible] bronze cast and finished by Messrs. J. Stone & [illegible] simultaneously controlled from t[illegible]

[illegible] the Institute opened on the 9th May and [illegible] in his presidential address, gave a review of the development [illegible]

MARINE MOTOR NOTES.

THE most prominent event of the past month has been the trial of the *Jutlandia*, the motor vessel built and engined by Messrs. Barclay, Curle & Co., a sister vessel to the *Selandia*, now voyaging in the Eastern trade. The trials have been successful, and the speed attained was 12 knots at one period of the trial, which was of an extended nature. On the east coast of Scotland, Messrs. Cran, Leith, who have been building several motor vessels during the past year, have launched a 41-ft. boat for a mission station in New Guinea. The type of motor being fitted in the boat is a Kelvin, of about 20 H.P. It is under consideration to run motor boats of a fair size on the Thames to Kew, to cater for the passenger service. The facilities given to reach the beauty spots up the river by land services are now so great that it may be difficult to keep up a good passenger traffic by the water route, yet it is the pleasanter passage way, and it is hoped that a plan will be carried into effect and the venture become a deserved success. The *Vulcanus* (Messrs. Anglo-Saxon Petroleum Co.) has been formerly referred to in these notes, and the second vessel of a similar type will shortly be under way, from the Netherlands Shipbuilding Co., and will be followed by three or four others in the course of the next twelve months, all to be fitted with sets of oil motors of about 1,800 H.P. combined. The motor vessels on order for the Glasgow Company of traders are well in hand, and probably the example being set for the canal traffic between the Forth and the Clyde will serve to spur into active life those who have had for some time the consideration of making use of the canals of England to a greater extent than is the case at present. Messrs. Harvey had some trials on the canal between London and Birmingham, and delivered cargo to the London Docks by means of a motor-driven barge, and the results were sufficient to show that regular boats would probably reap a good traffic return. One of the experimental barges was illustrated some months ago; since then several improvements have been made with a view to higher efficiency, and it is anticipated that the barge now on the course will be followed by others so that a regular and reliable service can be maintained. This ought to lead to an improvement being made in some of the canals, where there is great need for it. The new barge set of motors is of 15 B.H.P. by Messrs. Brooke, Lowestoft, the firm who made the motor for the first experimental canal barge. Messrs. Cran & Co. have launched one of the vessels for the Forth and Clyde service, which, as formerly described, is to be fitted with a Bolinder's engine.

MOTOR SHIP "JUTLANDIA."

THE *Jutlandia*, built by Messrs. Barclay, Curle and Co., Ltd., has now passed through all her trials and is about to set out for Copenhagen, and will be placed very shortly on the service between that port and Bangkok. As already stated in these columns the *Jutlandia* has been built by Messrs. Barclay, Curle & Co., Ltd., for the East Asiatic Company, and is a sister ship to the *Selandia* and *Fionia*. She is a vessel of 5,300 tons gross, and 7,400 carrying capacity, 370 ft. in length between perpendiculars, 53 ft. beam and 30 ft. moulded depth. Her two sets of oil engines, each developing 3,000 I.H.P., are of the Burmeister and Wain Diesel type and are designed to work on the four-cycle principle and each shaft is driven by eight cylinders, the diameter of the cylinders being 20·87 in. and the stroke 28·74 in. The engines are started and reversed by means of compressed air at a pressure of 300 lb. and the change was made on trial, from full ahead to full astern, in 12 seconds.

The results of the trials more than realised the expectations of the owners and builders as regards speed, fuel consumption and the general efficiency of the propelling machinery. The speed of the vessel on service is to be from 10½ to 11 knots. On the measured mile at Skelmorlie the speed attained was 12·53 knots on a horse-power of 2,740 indicated, and with the engines running at 138·5 revolutions per minute. The consumption was stated to be 0·333 lbs. of shale oil per i.h.p. per hour. The oil used on the trials had a specific gravity of ·855, but the engines are capable of being run on fuel of a considerably higher specific gravity. The builders estimate that in regular service the fuel consumption will be about 10 tons for each day of 24 hours' continuous running. The starting, stopping, reversing and manœuvring tests were equally satisfactory, each operation having been performed in a time that could not be approached by any installation of steam engines.

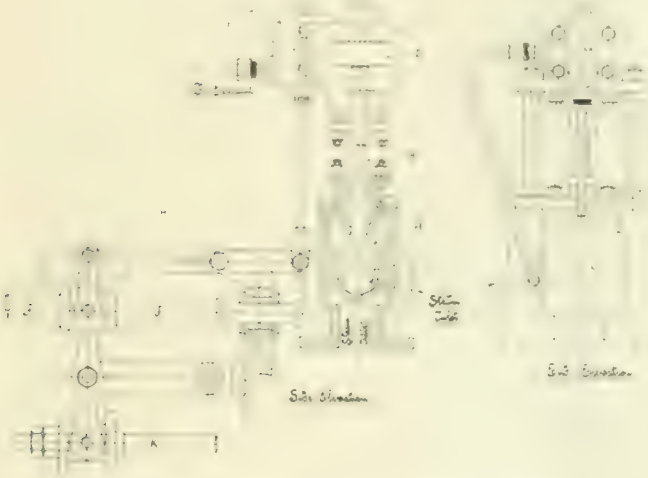
HEAVY OIL ENGINES.—Capt. H. Riall Sankey, R.E. (retired), delivered the first of a series of four lectures on "Heavy Oil Engines" before the Royal Society of Arts, under the Howard bequest, on the 20th April. He described the Diesel engine as commercially the most important, not only on account of its higher power, but also because of the large size to which it could be built. In the first engine built under Dr. Diesel's patent there was no water jacket, and this created difficulties which for some time stood in the way of its development. In the next engine, built by the M.A.N. Company, in 1897, a water-jacket was added. It was an experimental engine, and the results it gave led to the first commercial Diesel engine being constructed in 1898. This engine was of 60 b.h.p. It was rather remarkable that little or no change had taken place in the design in Diesel engines since 1898. The fuel economy was very much the same; it had not improved to any large extent. Until recently this country had been rather slow in the development of the Diesel engine. Lately, however, owing to the recognition by British manufacturers of the possibilities of oil, its development had been very fast; and for marine purposes a great impulse had been given by a paper read by Mr. Milton not very long ago, before the Institution of Naval Architects, and by a paper read before the Institution of Mechanical Engineers by Dr. Diesel himself. By means of diagrams, Capt. Sankey showed the great thermal efficiency of the Diesel engine, and added that, according to some engineers, the two-stroke Diesel engine would be the future marine engine.—The second lecture was delivered on May 6th and was principally devoted to a consideration of the various detail parts of the Diesel engine and the design of the various parts, such as cylinders, valves, pistons, connecting rods, crank shafts, frames, air compressors, etc., for four-cycle and two-cycle engines. The third lecture on the 13th of May dealt with the description and illustration by means of lantern slides of Diesel engines manufactured by the various makers, speeds and weight for land and marine engines; the various kinds of fuel which can be used in the Diesel engine, the lecturer pointing out that practically any oil is suitable. The concluding lecture was delivered on the 20th of May, and Capt. Sankey spoke on the economical results in respect of fuel and of total annual cost; comparison of Diesel, gas and steam engines in respect of capital cost, fuel cost and total annual cost; various applications to land and marine purposes; other heavy oil engines and semi-Diesel engines.

THE Hamburg-America liner *Imperator* was launched from the Vulcan Yard at Hamburg on the 23rd May. The giant liner displaces 50,000 tons, 4,000 more than the ill-fated *Titanic*. Her launching weight was 27,000 tons. The dimensions of the vessel are length 881 ft., beam 96 ft., and she will carry when full 800 first-class, 600 second-class, 975 third-class and 1,800 steerage passengers and a crew of 1,100. The *Imperator* has been fitted with the Stone-Lloyd hydraulic system of operating the bulkhead doors. The vessel, which was launched by the Kaiser, was laid down on the 18th June, 1910. Two sister ships are being built by Messrs. Blohm and Voss. The entire interior surfaces of the enormous bunkers have been coated throughout with Briggs' bituminous enamels and solutions.

STEAM-SAVING DEVICE FOR STEERING ENGINES.

WE have recently had brought to our notice a most simple and ingenious money-saving device in the form of a steam-saving cut-off valve to be applied to ship's steam-steering engines, of which we have pleasure in giving an illustration and description.

The adjoining part sectional diagram shows the complete arrangement, which consists of a mitre valve A and spindle forged in one piece, adapted to close on a seat in the valve box C, and as the steam is on the bottom of the valve there is no danger of the gear being choked in the event of the spindle breaking, as in such case the steam itself would lift the valve off its seat. On the top end of spindle B is fitted a piston D working in a steam



Steam-saving Cut-off Valve for Steering Engines

cylinder E, to which steam is admitted at the top or bottom by means of a small piston valve F, working in the valve chest G, which is served with live steam by a small bye-pass pipe from the box C, while another pipe carries the exhaust to the exhaust side of the control valve chest, or to the engine exhaust pipe. The valve F is operated by the pivoted lever H by means of the roller I, engaging in the specially designed slot at the end of the lever H. When the steersman turns his steering wheel he moves in the ordinary way the control shaft J of the steering engine, either one way or the other, to operate the rod K of the engine control valve. As this shaft moves it causes the roller I to trail along the slot so as to raise the lever H, which in turn draws the piston valve F down, owing to H being coupled to the valve spindle at the opposite end to I. Steam is thus admitted to the bottom side of the piston D, while the top side is opened to exhaust. This immediately raises the piston D and consequently opens the valve A and admits steam to the engine.

When the steersman ceases turning his wheel the steering engine with its usual hunting action moves the control shaft J back to mid position in order to close the control valve, and at the same time moves the roller I back and depresses the lever H so as to raise the piston valve to give steam to the top of the piston D, which immediately descends and closes the valve A. By this means there is no throttling or wire drawing action, as the valve remains open until ready to shut tight and *vice versa*. The advantages claimed for this valve are, that it saves steam and fresh water, and consequently coal, and it also allows the gear to come more quickly into action as the cylinders do not become choked with steam.

The patentees of this valve are Messrs. John Wigham and Son, of South Hylton, Sunderland, who specialize in the manufacture of steam-steering gears and steam winches, and they inform us that this valve has met with a success far exceeding their expectations and that they have some excellent testimonials from superintendents, captains and chief engineers who have tried it, and there is hardly a case where repeat orders have not followed the trial one.

It is important to note that the device can be readily fitted to any type of gear as well as to existing steering engines, so that its application has a very wide scope indeed, and having regard to its distinct merits there is little doubt that a large number of shipowners will avail themselves of the great advantages obtained by its use.

SCOTT'S SHIPBUILDING AND ENGINEERING CO., LTD., Greenock have recently launched for the British Admiralty the depot ship *Maidstone*. The vessel has a displacement of 3,000 tons and is intended to act as a mother ship to a fleet of submarines.

INSTITUTE OF MARINE ENGINEERS.—On the 22nd June a visit will be paid to the exhibition of non-ferrous metals, Agricultural Hall, Islington, when the following papers will be read: "Modern developments in the electro deposition of metals and alloys" by Mr. Geo. P. Lee (member). "Wave motion and modern developments in high frequency electricity" by Mr. A. F. Battle (member).

THE ICE AND COLD STORAGE ASSOCIATION.—The annual dinner of the Ice and Cold Storage Association was held in the Hotel Cecil on May 15th. Mr. J. T. Mitter (President) occupied the chair and proposed the loyal toasts to a responsive company. The toast of "Refrigeration and Cold Storage" was proposed by Mr. W. H. Kay (L.C.C.) and responded to by Sir Richard Solomon, High Commissioner for the Union of South Africa. The "Science of Refrigeration" was proposed by the President in an address which was listened to with great interest. Thanks and praise were accorded to the experimental work of the Association in the laboratory, dealing with the adaptation of heat, fitting it with the to the service of the engineer that the measures [illegible] were brought to bear on the subject of [illegible] in the refrigerator the reverse took place. The one was a [illegible] downhill process, while the other was uphill. [illegible] Sir Alfred Ewing, Director of Naval Education, [illegible] Sir Alfred [illegible] Mr. R. Enright [illegible] Mr. Mitter, in [illegible] the work of the Association during the past year [illegible] its interests during the year to come.

THE WORSHIPFUL COMPANY OF SHIPWRIGHTS.

ON the 15th of May a Livery Dinner of The Worshipful Company of Shipwrights was held at the Fishmongers' Hall presided over by Mr. J. Bell White, Assoc. I.N.A., the Master. A large and distinguished gathering was present, including :—

The Right Hon. the Lord Mayor (Sir T. Boor Crosby); Mr. Alderman and Sheriff Hanson; Mr. Sheriff G. Briggs, C.C.; the Marquis of Bristol, M.V.O., President, Inst. of Naval Architects; Dr. Clement Godson, M.D., C.M., V.D. (Immediate Past Master); Lord Aldenham, M.A., Master of the Spectacle Makers' Company; Commander Rupert Guinness, C.B., C.M.G., M.P., R.N.V.R.; the Hon. Reginald Talbot; Sir Fortescue Flannery, Bt., M.P.; Sir Joseph Savory, Bt., Past Master; Sir William E. Smith, C.B.; Sir J. T. Ritchie, Bt.; Professor J. H. Biles, Past Master; Sir Francis Edwards, Bt., M.P.; Rear-Admiral A. G. H. W. Moore, C.V.O.; Sir John C. Bell, Bt.; Col. Sir A. K. Rollitt, D.C.L., LL.D.; Lieut. Sir A. T. Dawson, R.N.; Sir T. Matthews; Capt. Sir Theodore Angier; the Rt. Hon. Sir Samuel T. Evans; Rear-Admiral C. J. Briggs, Controller of the Navy; Capt. H. Acton Blake, Deputy-Master, Trinity House; Sir W. Graham Greene, K.C.B., Permanent Secretary to the Admiralty; Sir Walter J. Howell, K.C.B., Secretary, Marine Department, Board of Trade; Col. Sir William H. Dunn, Alderman, 2nd Warden; T. L. Devitt, Esq., Chairman of Lloyd's Register; Rear-Admiral Herbert W. Savory, M.V.O., Director of Transports; Sir Edward Busk, Prime Warden, Fishmongers' Company; Col. Sir Philip Watts, K.C.B., F.R.S., 3rd Warden; Sir Francis J. S. Hopwood, G.C.M.G., K.C.B., Civil Lord of the Admiralty; the Hon. Sir Charles A. Parsons, K.C.B., F.R.S., LL.D.; Rt. Hon. Sir Edward Clarke, K.C., Senior Warden; Sir J. A. Ewing, K.C.B., F.R.S., Director of Naval Education; the Hon. John L. Griffiths, Consul-General for U.S.A.; Rear-Admiral H. E. Purey Cust, C.B., Hydrographer of the Navy; Sir George C. V. Holmes, K.C.B., K.C.V.O., Chairman, Board of Public Works, Ireland; Major P. A. MacMahon, F.R.S., Deputy-Warden of the Standards; the Rt. Hon. W. G. Ellison-Macartney, Deputy-Master, Royal Mint; Sir William H. White, K.C.B., F.R.S., Past Master; Sir Andrew Noble, Bt., K.C.B., F.R.S.; Lord Inchcape, K.C.S.I., G.C.M.G.; Col. R. Saxton White, President, North-East Coast Inst. of Engineers and Shipbuilders; Rear-Admiral E. F. Inglefield, Secretary of Lloyd's; Engineer-Com. W. McK. Wisnom, R.N.; Sir John Wrench Towse; Capt. R. Muirhead Collins, C.M.G.; Col. T. Davies Sewell, F.R.A.S., Treasurer; Major Jones; the Rev. A. R. Clemens, M.A., Hon. Chaplain; Messrs. Charles T. Martin, M.I.N.A.; Archibald Denny, LL.D.; Peter Denny, James McKechnie, Arthur Hill, Master, Armourers and Braziers Co.; H. T. Bailey, Past Master; J. Last Sayer, C.C., Deputy Past Master. The Rt. Hon. Lord Allerton, who had been elected 4th Warden for the year, was unfortunately prevented from being present owing to indisposition.

The Master first gave the toast of "Our Sailor King," and in proposing the toast of the "Royal Family" referred to the death of the King of Denmark, and said that he was well known to the citizens of London and highly esteemed. He was a model son, a model husband, a model father and a model King, and he was sure that their profound sympathy would go out to Queen Alexandra and her sister the Empress Marie of Russia in their sorrow.

Sir Edward Clarke, K.C., gave "The Lord Mayor, the Sheriffs, and the Corporation of London," and the Lord Mayor replied.

Sir William H. White, Past Master, in proposing "Our Royal and Merchant Navies," described the toast as the invention of the Master, and said it was particularly appropriate that they should honour it in that form in view of the fact that the Master had served both in the Royal Navy and the merchant navy. There was a deeper reason for classing together the war fleet and the merchant fleet of the British Empire. He was one of those who believed that instead of the mercantile fleet being a source of weakness in war it would be an absolute source of strength. There still remained in modern warfare a place for the merchant ship which none other could fill with equal advantage. Shipwrights recognised the all-important fact that in both the war Navy and the merchant navy it was the man that must stand first—the man behind the gun, the man in the engine-room, the stoker in the stokehold, the captain on the bridge. It was the man, the human element, that was the first and foremost and most necessary of all. The Shipwrights' Company stood for an all-powerful Navy, a Navy which would maintain the traditions of the past, our supremacy of the sea and the freedom of communication across the seas from the Mother Country to all parts of the Empire, not merely for themselves, but for the whole world.

Mr. Winston Churchill, in responding, said: In a gathering of shipwrights nothing could be more appropriate than the subject of naval construction, and it would be very exhilarating to canvass questions of naval construction—such as whether the ship should be larger or smaller, whether the guns should be bigger or not so big, whether there should be more guns or fewer guns, whether there should be more armour or less armour, etc., etc., but he must frankly confess that he found himself disqualified for the task of entering on such a discussion, as he knew too little to discuss these complicated technical matters before a company of shipwrights, and too much to discuss them before a strong representation of the Press.

But there were two general principles to which he might refer. The first was, the Third Sea Lord, who is the officer at the Admiralty charged with the care of the great province of *matériel*, the officer primarily responsible for the military construction of the Fleet in accordance with the policy of the Board of Admiralty, must be relieved of all unnecessary departmental work. He must have freedom to move about frequently in the sea going Fleet. He must not be burdened with the details of dockyard administration or the complexities of a financial statement, still less with the business and commercial transactions which, in ever-growing scale and ever-multiplying complications, are associated with all the duties the Admiralty is called upon to discharge. He must be free to give his undivided attention from year's end to year's end to the progress of naval science and the perfection of military design.

The second was that there must be maintained between the constructive side and the Board of Admiralty, on the one hand, and the officers of the sea-going Fleet, on the other, a constant and intimate connection.

It was his duty to express a deep and vital sense of the kindness and consideration with which he had been treated in his new office by men of every shade of political opinion, showing that although in England, although in Britain, there are several parties, there is only one Navy. It would be his duty to go again to Parliament this year for men, money and material, and although the additional Estimates would not be so large as some would hope and others would fear, he had no doubt that His Majesty's Government would be able to convince the House of Commons that what they would ask for would be both necessary and sufficient.

There was one aspect of naval concentration, a policy which the Admiralty have for a good many years pursued, to which he desired to draw attention. The fact that the Fleet has not only concentrated in the decisive theatre of European waters, but must be kept concentrated in, and in a certain sense, tied to that theatre, had been for some years creating a new want, a new need, a new opportunity for the great self-governing Dominions of the Crown. The Fleet could not move safely and freely to every part of the world to the same extent as in former years. Facts must be faced. With every new development in Continental navies, with every fresh squadron which took the water abroad, with every step in the ceaseless accumulation of naval strength with which we were confronted, the world-wide mobility of the British Navy became restricted.

It was there that the great opportunity, the great chance of the self-governing Dominions entered in, and they had already begun to seize it. Already we had seen the development in Australia of a strong modern fleet unit. New Zealand had contributed a noble ship to the general service of the British Navy. And in Canada men of all parties, of both races, were deeply stirred upon the problem and the share which the great Dominions should take in the means by which it and all other parts of the British Empire would be kept free from harm. He understood representatives of the new Canadian Administration were coming over here to consult with the Government and with the Admiralty upon the course of policy which should be adopted in the future. If the main developments of the last ten years had been the concentration of the British Fleet in decisive theatres, it seemed to him not unlikely that the main naval developments of the next ten years would be the growth of effective naval forces in the great Dominions oversea. Then they would be able to make what would be found to be a true division of labour between the Mother Country and her daughter States—which was that we should maintain a sea supremacy against all comers at the decisive point and that they should guard and patrol all the rest of the British Empire.

Captain H. Acton Blake (Deputy-Master of the Trinity House), who also responded, said he spoke for the men sailing under the red ensign, who did quiet, unobtrusive work, and got very little pay and very little honour. He was very proud of those men, for they were his brothers of the sea, with whom he had been associated for many years. It was the merchant seamen, with their spirit of

Senior Warden
Rt. Hon. Sir Edward Clarke,
K.C., P.C.

2nd Warden
Col. Sir Wm. H. Dunn

The Master
J. Bell White, Esq., Assoc. I.N.A.

3rd Warden.
Col. Sir Philip Watts, K.C.B., F.R.S.

4th Warden (Elect.
Rt. Hon. Lord Allerton, P.C., L.L.D.

adventure, their enterprise, and their far-reaching travels, who had really created the necessity for nearly all those interests which were represented with the Shipwrights' Company.

The Hon. John Griffiths (Consul-General, U.S.A.), in submitting "The Worshipful Company of Shipwrights and the Master," congratulated the company upon the fact that the Master this year was an Associate of the Institution of Naval Architects. The Guilds of London were still doing a good work, but he felt that they could do a great deal more. At this time, when almost every other ship one met on the high seas flew the British flag, it seemed to him that the Shipwrights' Company must occupy a unique position among the Guilds of London. It had always stood for good workmanship. He had long thought that the Guilds of London might render a great public service in contributing something to the solution of the present industrial situation. The Guilds from their membership, should select a representative committee to deal with all phases of the labour question.

The Master, in responding, said that although he had been an associate of the Institution of Naval Architects for many years, he had never ventured to read a paper, or even to criticize one. But he had had occasion to criticize the work of naval architects when he was crossing the Bay of Biscay in bad weather, and when the behaviour of the liner he was on was atrocious. Still in justice to the naval architect who designed the ship he really thought it was the stevedore who, to a great extent, was at the bottom of that trouble. In 1888 Sir William White discovered that in the Port of London there were no evening classes for shipwrights' apprentices, and conceived a scheme in that direction. A few members of the Company subscribed sufficient money to start such classes, and about ten years later a bolder scheme was attempted and an educational trust fund started. With the money they were establishing scholarships all over the country, and were doing a great deal of good. He referred to the position and power of the Company in bye-gone days, and mentioned the fact that in the reign of Charles I. the Lord Admiral of England recommended the King to grant a certain petition of the Company on the ground that "the Guild was of so great importance for the defence of the kingdom." He hoped there were many present who would live to see the Company again in that proud position. He referred briefly to the influence of sea power on history, and quoting the words of the poet—"The Nile is all in all to the Egyptian," remarked how much greater was the truth that the "Sea was all in all to England." It was, he said, a matter of satisfaction to all those present—it was an added sense of security to our people in every part of the globe—the knowledge that their distinguished guest so fully realized the significance of those words. He concluded his remarks by quoting the pregnant lines of Shakespeare,

"England is safe if true within itself"

. . . . . .

"Let us be backed with God and with the seas
Which He has given for fence impregnable,
And with their helps only defend ourselves;
In them and in ourselves our safety lies."

Lord Inchcape, in submitting "Our Guests," referred to the presence of, among other guests, Sir Walter Howell, whose hands, he said, had been so full during the last few days. In his judgment, discretion and ability in advising the Board of Trade in connection with the recent disaster shipowners had every confidence.

Mr. W. Ellison-Macartney suitably responded.

THE ISHERWOOD SYSTEM OF SHIP CONSTRUCTION.—On April 27th Mr. J. W. Isherwood left on the *Lusitania* for America to see various steamers which are under construction there. These include two steamers 520 ft. long for the U.S. Government for the purpose of supplying coal and oil to the fleet. One of them was launched 5½ months after the laying of the keel. Two steamers, 600 ft. long, are being constructed at Cleveland for the Pittsburg Steamship Co. There are new 186 vessels built or building on this system, while during the last four months sixty vessels have been contracted for. There are now nine tankers building of not less than 15,000 tons. Mr. Isherwood claims that his system will enable vessels readily to be built with double bottom and sides up to and above the water line and the longitudinal system is better adapted to resist collision.

THE BANDY "ELECTRIC" FAN.

THE equipment of a steamship designed for human freight nowadays leaves little to be desired and embraces almost every possible luxury which science and skill can devise, and which even the most sybaritic traveller can call for.

It is only within the last thirty years that a sea voyage of thousands of miles could be viewed with anything like equanimity, and as our large ocean-going steamers have improved in comfort and convenience feelings of objection have gradually given way to those of considerably less poignancy, until nowadays a journey to the other ends of the earth is viewed with almost as little concern as the annual trip to the seaside.

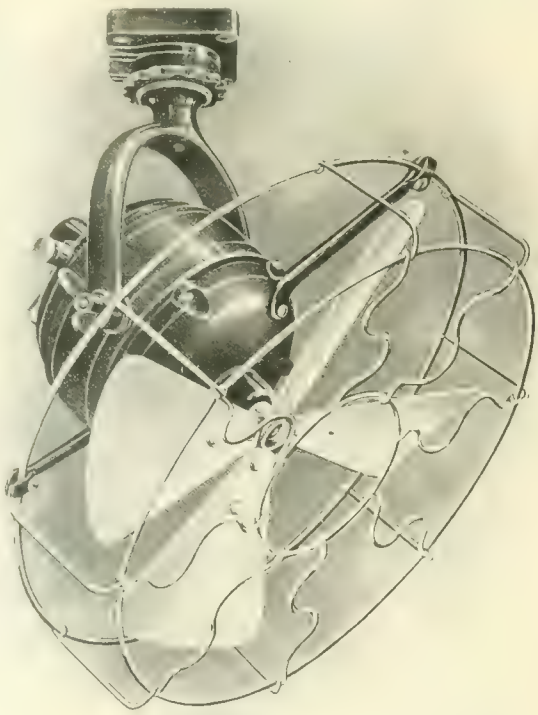


Fig. 1.

One of the most appreciated features made for the comfort of travellers by sea was the better ventilation by the use of electric fans in the saloons and cabins. These, in the initial stages, were at the disposal only of those who could afford to pay an extra charge for the use of them, but they now find a place in all grades of passenger accommodation and all passengers from the third-class to the more fortunate occupants of cabins *de luxe* revel alike in their comforting coolness.

Foremost amongst the many makes of fans and among the very few specially adapted for ship use are those of the well-known "Bandy" type. Messrs. Bergtheil & Young, Ltd., of Finsbury Court, Finsbury Pavement, E.C., who are the sole manufacturers, realized when the demand for fans for ships first commenced that it was necessary to provide a thoroughly reliable article, one which would stand up against the

somewhat stringent conditions under which they have to work, and therefore from the first refused to identify themselves with the cheap types of fans, and have adopted the policy of only making those which can be thoroughly recommended as the best articles of their kind.

The illustration of the fan in Fig. 1 shows one of their "Bandy" Patent Cabin Fans, the advantages of which have been recognised by practically all the leading shipowning companies.

The fan in question is adapted to be fixed to the ceiling or deck and not on the bulkhead, thus obviating any chance of disturbance and annoyance to passengers in adjacent cabins. The supporting device is rigidly fastened to the deck and is so made that the fan can be fitted or removed at will by merely loosening the large milled nut at the lower part of the supporting block. Even if this nut should shake loose through not being screwed home it is still impossible for the fan to fall, as the supporting device with which the shank engages is recessed and the fan is held in position by its own weight. The fan has, in addition, all the advantages of an ordinary swivel fan, allowing the breeze to be deflected in any desired direction, in which position it can be tightly clamped.

Fig. 2

Fig. 2 represents the "Bandy" ornamental type of saloon fan, which is of a very handsome design and lends itself to all types of finer metal finish, such as nickel, electro-plate, gold plate, oxidized silver, brushed brass, etc.

We understand that a large quantity of these fans, together with their patent cabin type, have recently been supplied for installation in the new fleet of liners just built for the Adelaide S.S. Co. of Australia.

We may add that in addition to their fans this firm also make a patent electric punkah, a number of which have been installed in the boats of the Orient S. .N Co. and British India S. N. Co. and in many other steamers.

Just at the present time these fans are in such demand that their popularity may be gauged by the fact that it is claimed to-day to be difficult to pick up any shipping list which did not include quite a number of boats in which such fans had been fitted.

FOREIGN NOTES.

Austria.

[illegible]

France.

[illegible] Government Dockyard at Brest and Lorient have received orders to lay down the keel plates of one battleship each. The ship to replace the *Jemmapes* is to be placed with a private yard.

Great interest is being taken in hydroplanes and an Aeronautic Staff has been established to develop and gather experience in the construction and handling of hydroplanes with a view to supplying the fleet with them.

The destroyer *Dague*, which is fitted with Brogard turbines, is carrying out her trial runs, and with forced draught obtained a speed of 33·118 knots, whereas the contract speed was only 31 knots. The consumption of fuel oil was 6·[illegible] kilo per square metre heating surface, about 11 per cent under the contract term.

The cruiser *Foudre* has been fitted with a platform, situated between the funnels for the reception of the new hydro aeroplane "Esnault."

The South Atlantic Company has just purchased from the Castle Line the following sailing vessels:—The *[illegible]*, the *[illegible]* and the *Stafordshire*. The two [illegible] built in 1896, of 5,500 tons each. The *Stafordshire*, also a four-master, was built in 1893 at [illegible] and belonged to the Bibby Line.

Germany.

The North German Lloyd has placed an order for a passenger and cargo steamer for the New York [illegible] with the Stettiner Schichau, which is to deliver the steamer by August [illegible]. The vessel is to be [illegible] long and have a displacement of [illegible] tons. It will [illegible] passengers, besides a [illegible] cargo. The speed is to be [illegible] than [illegible] knots. Special care has been devoted to arrangements and devices for fire [illegible] which are found.

The German-American Petroleum Company has given an order for one tank steamer to the Seebeck Shipyard, [illegible] to be of [illegible] tons capacity. The Wessel & Co. shipyard has a great amount of work on hand. There are extra vessels in course of construction, including

two cruisers and one battleship for the German Navy. The engineering department has several large Diesel motors in course of construction.

Another Government Dockyard is to be established at Cuxhaven, which is to afford accommodation for war vessels of the largest size. At the present time Cuxhaven is made use of for only those vessels which cannot be berthed at Wilhelmshaven. The newly constructed battleship *Oldenburg* is on the point of starting on her trial runs.

The shipyard "Weser," Bremen, has just launched the cargo steamer *Pennsylvania* to the order of the Hamburg America Line. The vessel has a deadweight capacity of 7,500 tons and is to be equipped with two Diesel motors, on the Junkers system, each to develop 800 H.P.

It is reported that the Admiralty is negotiating for the purchase of hydroplanes for the fleet and is about to issue invitations to the public to take part in a competition for the best and most reliable hydroplane.

The North German Lloyd has placed an order with the Bremen Vulcan for two cargo steamers of the same capacity as *Rheinland* and *Elsass*, now building.

Greece.

Recently nineteen tenders for the construction of war vessels were opened at a meeting of the Cabinet. Those of English and American firms were the most favourable for an armoured cruiser, the German for two destroyers, German and Austrian tenders for four torpedo boats. The decision of the Government has been reserved.

Russia.

The available shipyards are not able to build more than 30 per cent. of the ships required by Russia in the next five years, and for this output the shipyards have to be extended and equipped with machinery, which will involve the outlay of many millions of roubles. This is chiefly caused by the fact that the future "Dreadnoughts" are to be 700 feet long as against the 590 feet length of those now building. Private shipyards are to be specially considered in placing the future orders.

The Budget includes the following war vessels for the Baltic, which are to be commenced at once:—Four armoured cruisers of 28,000 tons and a speed of 27 knots, with an armament of twelve 14-inch guns, placed in four armoured turrets. These vessels are to be built at the Imperial Dockyards. The private shipyards will receive orders for four cruisers of 8,000 tons displacement and for thirty-six destroyers of the "Nowik" type. There are further twelve submarines of the "Black Sea" type to be constructed. A new base for the Baltic Fleet is to be established at Reval, for which a large equipment of machinery will be required.

Turkey.

The Admiralty has worked out an extensive naval construction programme which includes twenty vessels to be built in the course of the next six years. It is stated that the Admiralty is already negotiating with leading English shipyards to undertake their construction on terms similar to those of the two "Dreadnoughts" now being built in England.

The increase of the fleet has shown that the existing dockyard in the Golden Horn is insufficient, and therefore the plans of the Admiralty suggest the establishment of a new Dockyard in the Bay of Ismid on the opposite coast of Asia Minor.

U.S.A.

It is reported that the Secretary for the Admiralty is bringing in a Bill to authorize him to purchase material for the ships of war from foreign countries, this material to enter the U.S. free of Import Duty. This material is to include all classes of material required for the construction of ships. Orders for the two battleships *Nevada* and *Oklahoma* have been placed with the Fore River Co. and with the New York Shipbuilding Co. for the price of £1,200,000, excluding the armament. The former is to be equipped with the improved Curtis turbines and the latter with reciprocating engines. The Admiralty is further entertaining the construction of a dock of 600 feet length on the Atlantic Coast, of a similar one on the Pacific coast, and the sale of the floating dock at Pensacola, which is only available for ships up to 5,000 tons. Further plans are the building of fifteen coaling steamers of 12,000 tons displacement for the fleet, fitted with the latest devices for the rapid coaling of warships.

BOARD OF TRADE EXAMINATIONS.

APRIL 25th, 1912. — LONDON.—*1st Class:* J. Calder, R. Galway, R. Taylor. *2nd Class:* C. Filmer, C. Fowling, N. Hopkins, J. Miller.

GLASGOW.—*Extra 1st Class:* J. Crawford, W. MacFarlane, A. Paterson.

GREENOCK.—*1st Class:* J. Cameron, D. Reith, J. Skeock, N. Smith, J. Spence, W. Wallace, W. Whyte. *2nd Class:* D. Duncan, J. Gordon, J. MacIntyre.

BRISTOL.—*1st Class:* R. Clargo.

NORTH SHIELDS.—*1st Class:* S. Burdon, A. Mavin, G. Thompson, W. Wolsey. *2nd Class:* W. Ennis.

LIVERPOOL.—*1st Class:* H. Botting, J. Burns, T. Jones, L. Lee. *2nd Class:* F. Goetzee, S. Hudson, C. Tunnicliffe.

SUNDERLAND.—*Extra 1st Class:* J. Thompson. *1st Class:* A. Bennett. *2nd Class:* R. Chapman, E. Honey, J. Keechner, A. Thomas.

ABERDEEN.—*1st Class:* F. Lyall, P. Thompson. *2nd Class:* C. Hopkins.

HULL.—*Ex. 1st Class:* J. Walker. *2nd Class:* H. Brown, L. Dimberline.

MAY 2nd, 1912.—LONDON.—*Extra 1st Class:* W. Waid. *1st Class:* F. Gathergood, H. Hory. *2nd Class:* E. Boydell, C. Dodgson, L. Perry.

GLASGOW.—*1st Class:* G. Baird, J. Birrell, T. Boyd, J. Grant, F. Hardie, R. Macleod, J. Milree, R. Prydie, R. Rintoul, S. Wheatley. *2nd Class:* W. Henderson, W. Macdonald, A. Thompson, M. Wardrop, A. Willock.

FALMOUTH.—*1st Class:* J. Nicholls. *2nd Class:* J. Langdon.

LEITH.—*1st Class:* R. Baxter, J. Laidlaw.

LIVERPOOL.—*1st Class:* R. Bridson, R. Grice, W. Moore, W. Seed. *2nd Class:* D. Chase, A. Owen, E. Ridding, W. Thompson.

NORTH SHIELDS.—*1st Class:* G. Baker, J. Smith, T. Storey. *2nd Class:* J. Bryars, R. Clarke, B. Newton.

CARDIFF.—*2nd Class:* C. Hughes, F. Kelly, H. Perrett, A. Powell, F. Taylor.

SOUTHAMPTON.—*2nd Class:* A. Case, W. Lockhart, J. Oliphant, A. Walls, L. Wishart.

BELFAST.—*1st Class:* S. Blair.

MAY 9th, 1912.—LONDON.—*1st Class:* R. Catton, J. Corlett, S. Herbert, F. Hodge. *2nd Class:* T. Watson, E. Whitham.

GLASGOW.—*1st Class:* W. Begg, G. Francis, H. Martin, J. Nelson. *2nd Class:* R. Aitken, H. McFetridge.

DUNDEE.—*2nd Class:* J. Dawson, J. Stewart, C. Will.

LIVERPOOL.—*1st Class:* H. Bishop, J. Busby, H. Latus, G. Williams. *2nd Class:* W. Bailey, N. Oulsnam.

NORTH SHIELDS.—*1st Class:* J. Henderson, W. Hills. *2nd Class:* J. Armstrong, J. Bolton, G. Byers, R. Cook, J. Dickie, R. Laidler, W. Leask, G. Moore.

MAY 16th, 1912.—LONDON.—*1st Class:* B. Blowfield, J. Goddard, D. Grey, S. Marshall. *2nd Class:* D. Esdon, W. Gorman, L. Pallant-Sorge, J. Stewart-Lee, A. Strange.

GREENOCK.—*1st Class:* J. Ferguson, A. Macintosh, G. McNaught, P. Prince, J. Williamson. *2nd Class:* P. Buchanan, W. Davidson, J. Dunbar, A. Grieve, D. Macintosh, J. Moffat, J. Richmond.

LIVERPOOL.—*1st Class:* T. Evans, R. Ritchie, W. Thompson, G. Whitton, G. Williamson. *2nd Class:* C. Dahl, T. Nuttall.

NORTH SHIELDS.—*1st Class:* E. Brough, A. Palmer. *2nd Class:* T. Aitchison, H. Dixon, A. Hedderly, H. Lamb, S. Lea, J. Newbegin, J. O'Neill, F. Scott.

HULL.—*1st Class:* W. Powell, F. Schumm. *2nd Class:* A. Watson.

MARCONI'S WIRELESS TELEGRAPH CO., LTD., have contracted to supply and erect a radio-telegraph station at Accra, a port on the Gulf of Guinea, about eighty miles east of Cape Coast.

INSTITUTE OF MARINE ENGINEERS.—The Institute is expected to pay a visit on June 29th to the William Froude Experimental Tank, National Physical Laboratory, Teddington.

Industrial and Trade Notes.

THE CLYDE AND SCOTLAND.

(From our Own Correspondent.)

New Naval Ships.—Since last month's notes were penned two important naval ships have been launched from Clyde shipyards. On April 30th, Messrs. William Beardmore and Co., Ltd., Dalmuir, sent afloat H.M.S. *Dublin*, one of the "Town" class of scout cruisers, the naming and launching ceremonies being performed by Lady Constance Hatch. The new vessel represents in several important respects an advance on her predecessors in this class, which are all ships of high speed, wide radius of action and capable of keeping at sea in heavy weather. The type has not advanced in length, being still about 450 ft., but their breadth, draught and displacement have been increased gradually in each succeeding naval programme, and in the Dublin there is a beam of about 50 ft., with a displacement of 5,500 tons and a draught of 16 ft. The increase in displacement has been utilized to improve the sea-going qualities, and to provide increased protection and more powerful armament. The *Dublin* is the third vessel of the class built by Messrs. Beardmore, who have also at present on hand two battleships and a destroyer just completed. The other naval ship launched was the scout-cruiser *Southampton*, which Messrs. John Brown & Co., Ltd., Clydebank, put into the water on May 16th, the naming ceremony being performed by Lady Katherine Somerset. Like the *Dublin*, the *Southampton* is of the "Town" class of second class cruiser, and is of the same dimensions, build and armament. The propelling machinery in her case consists of two sets of Brown-Curtis turbines, placed in separate watertight compartments. The ahead and the astern turbines are incorporated in one casing, and are complete with all the latest improvements as regards manœuvring. Steam will be generated in twelve water tube boilers of the Yarrow type, fitted with superheaters, designed to use coal and oil fuel, arranged in three boiler-rooms and worked under the closed stokehold system of forced draught. The machinery is designed to develop 25,000 horse power and to give the vessel a speed of 25½ knots in normal load conditions.

Merchant Ship Launches.—During the period under review a large number of steamers for merchant service were sent off the stocks at Clyde shipyards, as many as four vessels of large size being launched on the same day as H.M.S. *Dublin*. These consisted of the *Samarinda*, of 445 ft. in length, built by Messrs. William Hamilton & Co., Port Glasgow, to the order of the Stoomvaart Maatschappij Rotterdamsche Lloyd, Rotterdam, and engined by Messrs. David Rowan & Co., Glasgow; the *Omi Maru*, of about 4,000 tons, built by Messrs. Napier & Miller, Old Kilpatrick, for the Nippon Yusen Kaisha, Tokio, and engined by Messrs. Dunsmuir & Jackson, Govan; the *Barkmoor*, of 5,500 tons, built and engined by Messrs. Barclay, Curle & Co., Whiteinch, for the British India Steam Navigation Company; and the *Saint Dunstan*, of 385ft. length, built by Messrs. Russell & Co., Port Glasgow, for Messrs. Rankin, Gilmour & Co., Liverpool, and engined by Messrs. Rankin & Blackmore, Greenock. The Greenock and Grangemouth Dockyard Company launched the oil-tank steamer *Heva*, of 7,000 tons carrying capacity, built to the order of the Deutsche Amerikanische Petroleum Gesellschaft, Hamburg, and to be engined by Messrs. Rankin and Blackmore, Greenock. Two bucket dredgers were launched during the period, one the *Robert Tassell* by Messrs. William Simons & Co., Renfrew, for the Taff Vale Railway Co., and the other by Messrs. Fleming & Ferguson, Paisley, for the Tyne Improvement Commissioners, Newcastle. Included in the output also were several motor ships. The *St. George*, a triple-screw tunnel motor vessel, 110 ft. in length, built by the Ailsa Shipbuilding Co., Troon, for the British Foreign Office; the *Dorkin*, 68 ft. in length, built by Messrs. John Cran & Co., Leith, for the Coasting Motor Shipping Co., Glasgow, one of a fleet of eighteen oil-engined vessels being built in various yards for the Company named.

New Contracts.—A fair number of fresh contracts were booked during the period under review, the following being the principal items:—

Messrs. Barclay, Curle & Co., Whiteinch, have been commissioned to build a new passenger and cargo steamer for the Union Castle Line for that Company's service to the East Coast of Africa.

The Clyde Shipbuilding and Engineering Co., Greenock, are to build and engine a steamer of [illegible] for Messrs. R. P. Sanderson & Co., Manchester.

The Caledon Shipbuilding Company, Dundee, have received an order from London owners to build a cargo steamer of about [illegible] tons carrying capacity. She will be fitted with Diesel engines.

Messrs. Mackay Brothers, shipbuilders, Alloa, have received an order from London owners for a cargo steamer of [illegible] tons deadweight capacity.

Swift Turbine Yacht.—Messrs. Yarrow & Co., Scotstoun, launched on May 15th a twin-screw yacht named [illegible], which they have built to the order of Mr. P. W. Rouse, of New York. The vessel, which is of Yarrow's special design, is 205 ft. in length and 18 ft. 6 in. beam, and is intended to attain a speed of [illegible] knots, thus constituting her one of the fastest pleasure craft yet built. The propelling machinery will consist of Parsons turbines driving two shafts, and steam will be supplied by two of the latest Yarrow boilers fired with oil fuel.

Shipyard Extensions.—Messrs. Harland & Wolff, Belfast, whose acquisition of the shipyard and engine works of the London and Glasgow Shipbuilding and Engineering Co., Ltd., Govan, was recorded in last month's notes, have now also acquired the site of Messrs. Mackie & Thomson's shipyard, which adjoins their recently purchased property. Arrangements have been completed for taking possession of the ground at an early date, and the intention is understood to be the combination of the two establishments into one large yard. The London and Glasgow Co.'s yard extends to over 10 acres, while Messrs. Mackie & Thomson's occupies an area of roughly 6 acres. Messrs. Harland & Wolff will be able to command a large stretch of river frontage, extending from the Clyde Trust Graving Docks on the east to Govan Ferry on the west. They have, in addition, of course, the outfitting dock forming part of the London and Glasgow Co.'s yard, as well as their extensive engineering and boiler-making works at Linthouse Quay on the other side of the river. Messrs. Mackie & Thomson, it should be noted, will retain all their present shipyard plant—Messrs. Harland and Wolff having acquired the ground only—so that the firm will continue to carry on shipbuilding on the Clyde, but on a site yet to be acquired.

Messrs. Barclay, Curle & Co., Whiteinch, who about three months ago took over the shipyard, graving dock and repairing work of Messrs. John Stewart & Sons, Ltd., have acquired about 8 acres of additional land to the east of these works, and intend to lay down building berths capable of taking at one time two vessels each of [illegible] ft. in length. As the establishment of Messrs. Stewart & Sons extended to about 23 acres, the Elderslie works of Messrs. Barclay, Curle & Co. will now cover an area of [illegible] acres. The firm have not yet started to lay out the new engineering establishment here, but they expect to have this work well advanced in about six months. These new docks, as has already been recorded, are to be designed especially for the manufacture of large oil engines for marine purposes. Diesel engines of the Burmeister and Wain type, this firm being associated with the Clyde firm as regards this undertaking.

TYNESIDE AND WEARSIDE.

(From our Own Correspondent.)

Tyneside.

THE shipyard and engine works on both sides of the river still continue to be very busy, and [illegible] the effects of the coal strike seem to [illegible] very slowly, many of the shipowners and [illegible] are hesitating to realize what the strike meant to them, those that had large stocks in hand not [illegible] the loss.

Messrs. Armstrong, Whitworth & Co., Ltd.—The yards of this company are full of work, and orders are still coming in. The extensions at the Hawthorn yard are proceeding very satisfactorily, and it is hoped will be finished at an early date.

Messrs. Palmer's Shipbuilding and Iron Co., Ltd., are very busy on the battleship *Orion*; *Mary* the vessel being well advanced; the boilers are being fitted on board the engines are also well under way. It is reported that this firm has received orders to build two destroyers for the British Admiralty.

Smith's Dock Co., Ltd.—The dry docks of this firm continue to be well occupied and the firm are also carrying out extensive repairs afloat.

The Wallsend Slipway and Engineering Co., Ltd., are very busy. They are building the engines for the tank steamships which Messrs. Swan Hunter & Wigham Richardson Ltd are building for the Anglo-Saxon Petroleum Co., Ltd. This company has plenty of work on hand, and among other ships are the oil tank steamships for the Anglo Saxon Petroleum Co. Ltd. These vessels are being specially built both to carry oil and general cargo, and are being fitted with a special steaming arrangement, so that the holds may be thoroughly cleaned and disinfected after carrying oil so as to be available for general cargo.

Wearside.

Work continues to be very brisk at all the shipyards and engineering works on the river in fact they are so busy that more men are required than obtainable.

The Sunderland Shipbuilding Co., Ltd., have a large amount of work in hand and have secured the order for a cargo steamer for Messrs. Holder, Middleton & Co., London.

Messrs. J. L. Thompson's Yard continues to be very busy and have orders on their books to last them a considerable time.

Messrs. John Dickinson & Co., Ltd., have a large amount of work to be got through amongst which is a set of engines for the cargo steamer that Messrs. the Sunderland Shipbuilding Co. are building for Messrs. Holder, Middleton & Co.

Messrs. MacColl & Pollock still continue to be very busy, and have a large amount of work on hand, both for ships building on the river and other ports.

Messrs. S. P. Austin & Sons, Ltd., have had the new steamer *Melton*, built for the Denaby and Cadeby Main Collieries, Ltd., out on her loaded trial, the result being very successful, a speed of 11¾ knots on the measured mile being attained. The steamer *Rondo*, launched late in April, is now practically ready for sea, and is in dry dock being painted preparatory to leaving for her loaded trial. A collier steamer of about 3,000 tons deadweight is being plated another collier of about 4,000 tons deadweight is being framed, and the frames of a collier of about 5,000 tons deadweight are now being turned; these vessels are being built for London coal factors and will occupy the building berths for some time. Repairing work is not being carried on so extensively as during the miners' strike, owners having now found employment for their vessels; the Company, however, have several vessels in hand under repairs and others are booked to follow. Two locally owned steamers have just been put through Lloyd's special surveys.

Messrs. Osbourne, Graham & Co. have just sent to sea a high-class vessel for the Union Steamship Company of New Zealand. She is specially constructed for their work and carries 3,700 tons on a light draught and has a speed of 11 knots when loaded. A patent Monitor vessel for well-known Norwegian owners is shortly to be launched; the vessel will carry 3,300 tons on 18 ft. draught and is expected to steam 9 knots on about 10¾ tons. She will be equipped with Capt. Sieurin's patent discharging gear.

THE TEES AND HARTLEPOOLS.

(From our Own Correspondent).

Middlesbrough.

Messrs. Sir Raylton Dixon & Co., Cleveland Dockyard, are very busy. Amongst recent orders secured are two oil tank steamers for the Anglo-Saxon Petroleum Co.

Messrs. Smith's Dry Dock Co., South Bank, are full of work, having upwards of forty steamers building and repairing on the Tees and at South Shields. The s.s. *Fuesteventura* for Las Palmas, s.s. *Monmouthshire* and *Saxon Briton* have extensive damage to bottom, and the s.s. *Chatham*, 3,653 gross tonnage sold by Messrs. Watts, Watts & Co. to a German firm is being converted into an oil tank steamer.

Messrs. W. Harkess & Co. are expecting to secure an order for a small steamer in the market, and are otherwise well supplied with old and new work.

Messrs. Richardsons, Westgarth & Co. continue to be very busy. Amongst the orders for new work is a set of triple-expansion engines and boiler to the largest boat undertaken by Smith's Dry Dock Co.

Stockton and Thornaby

Messrs. R. Ropner & Sons are reported to have secured the order to build two cargo steamers of 8,000 tons dead weight each with engines by the North Eastern Marine Engineering Co., Sunderland, for Norwegian owners.

Messrs. Richardson, Duck & Co., in addition to having a large amount of work on hand, have secured the contract to build a cargo steamer for local owners.

Messrs. Blair & Co. are reported to have more orders on their books than at any time in the history of the Company, mostly for steamers building on the Tees and Wear; one contract is reported to be for a small cargo steamer to be built at Messrs. Irvine's Shipbuilding and Dry Dock Co.'s Harbour Dockyard, West Hartlepool.

West Hartlepool.

Messrs. Furness, Withy & Co. have sold the s.s. *Cheviot Range*, 3,458 gross tonnage, to O. de Lucovich, Trieste (Messrs. Lucovich, Banaz & Harres, London), for about £28,000.

Messrs. W. Gray & Co. have sold the s.s. *Fernley*, 3,820 gross tonnage, to local owners.

Messrs. Irvine's Shipbuilding and Dry Dock Co., Harbour Dockyard, are very busy both in new and old work. They are reported to have secured the order to build a small cargo steamer for Messrs. Pyman & Co. with engine by Messrs. Blair & Co., Stockton.

Messrs. W. Gray & Co.—Among the new orders secured are two large steamers for the Ellerman Line, Liverpool.

Hartlepool.

The Central Marine Engine Works of Messrs. W. Gray and Co. are very busy, as they have to construct the engines and boilers for all the new steamers building by the firm.

Messrs. Irvine's Shipbuilding and Dry Dock Co., Middleton Yard, have secured the order for a large steamer for Messrs. Furness, Withy & Co., also a medium-sized cargo steamer for local owners.

Messrs. Richardsons, Westgarth & Co. have recently secured the order for two turbines for the Electrical Generating Station of the West Hartlepool Corporation. They are now very busy with turbines and condensing plants, and have a great deal of marine work on hand, having to engine a medium-sized cargo steamer building by Messrs. J. Laing & Son, Sunderland; also the large steames for Messrs. Furness, Withy & Co., building by Messrs. Irvine's Shipbuilding and Dry Dock Co., Middleton.

THE HUMBER AND DISTRICT.

(From our Own Correspondent).

Immingham Dock.—The Great Central Railway Company sent out notifications to Humber shippers that the new dock would be opened on the 15th May, and from that date would be available for the admission of vessels for the purpose of scraping, painting and cleaning the bottom of the ships. On the date mentioned the s.s. *Nax*, of Stockholm, steamed into dock. There was no ceremony, this being reserved for the official opening by Royalty in August. Definite announcements will be issued later.

South African Trade.—The question of a direct line of steamers from Hull to South Africa was brought forward by Mr. Harold Sissons at the meeting of the Hull Chamber of Commerce and Shipping. He pointed out that the trade of Hull with South Africa could be increased if the facilities were increased. The matter was referred to the Shipping Committee.

R.M.S. "Bayardo" Wreck.—Operations were commenced on Monday by Messrs. I. Dehees, Ltd., salvage contractors,

for the destruction of the *Baltic* wreck. It is anticipated that the work will occupy a period of two months, at present the operations are being confined to taking off the top gear. The firm are endeavouring to get a much cargo out of the wreck, and will keep up position at a time, so as endeavour to reach more of the cargo. Much care will have to be taken, because if the charges are too powerful considerable damage would be done to the Alexandra Dock and Morgan Docks' foreyard, where the *Baltic* was built, and the fact of the wreck being so close to the city.

The Hull Central Dry Dock and Engineering Co., Ltd.—have been exceedingly busy during the month, and the immediate prospect are very good. Over thirty steamers have passed through the firm's hands, in graving and wet docks, some of them being very extensive repairs, etc.

Messrs. C. D. Holmes & Co., Ltd., engineers and boiler makers.—The old established firm are working night and day, completing engines and boilers, Crawlers patent compound winches, also auxiliary machinery. The outside staff has been very busy fitting machinery into several new vessels for local and outside owners. The branch shop at Alexandra Dock has had a fair run of work, and is still busy overhauling vessels.

Messrs. Stewart & Craig, engineers and ship repairers, have had an exceptional run of repair work during the month in all their departments, having executed a great amount of work on steamers, trawlers, sailing ships and tugboats.

Thomas Tate, engineer and boilermaker, has had a good month on repair work, etc., and fitting compound engines, new tail shaft turned on the s.s. *Stevens*, also overhauling engines and boiler on the Corporation yacht, and repairs on several coasting steamers and tugboats.

Messrs. Amos & Smith, Ltd., engineers and boilermakers, are still very busy and have a night shift running again. They have been successful in securing several orders for boilers, etc., for trawlers and herring gutters now building. The outside staff is engaged on general repair work on local and outside steamers. The branch shop at Alexandra Dock is receiving a fair share of repair work, also graving dock repairs, etc.

Messrs. Cooper & Co., Ltd., engineers and ship repairers, have been exceedingly busy with repair work on many outside and local steamers, opening out machinery and boilers for Lloyd's and Board of Trade Surveys, etc., and some of the steamers have had very extensive damage repairs. The firm's own graving dock has also been fully employed with docking steamers, some undergoing heavy repairs. The moulding, pattern and boiler and smiths' shops have been very busy, and several orders for Cooper's patent propellers for home and foreign expert have been received. The branch at Alexandra Dock has also had a fair amount of repair work, opening out for surveys, etc.

Messrs. Earle's Shipbuilding and Engineering Co., Ltd., have been successful in securing the order to build two large steamers for Swedish owners. The new s.s. *Scotsman*, for the Wilson Line, has run her trials and been taken over by the owners, and is now loading for her maiden voyage for the Mediterranean. The yard is very busy with new work and has had a fair run of repair work, both on their patent slips and engine and boiler shops. The s.s. *Thurland Castle* is now berthed in the graving dock, Alexandra Dock, for heavy and extensive repairs, both to hull and machinery.

The North-East Coast Engineering Works, Ltd., have had a large amount of general repair work and graving dock repairs on the following steamers: [illegible] *Dorking* [illegible] *Hesperia* is now in the graving dock undergoing extensive repairs, and going through Lloyd's Survey, necessitating the renewal of a large number of deck plates, and extensive repairs to hull, [illegible] engine and boiler repairs. The firm are also overhauling the tug *Crusader*.

Messrs. Woodall & Co., engineers and boilermakers.—During the past month the firm have been [illegible] the following steamers: [illegible] the work being mostly repairs and opening out for inspection. The outside shop is engaged on boilers for the L.C.C. and several small dispatch. The firm are also making a boiler-scaling appliance for the combustion chambers of marine boilers.

Messrs. Cochrane & Sons, shipbuilders, Selby, are busy executing the contract for new trawlers in their yard, for local and outside owners, and are also building a small cargo steamer for coasting trade for Hull owners.

Messrs. Cook, Welton & Gemmell, shipbuilders, Beverley, have been successful in securing orders for new trawlers for local owners and others, and the departments of the yard are at full pressure.

SOUTH OF ENGLAND AND ISLE OF WIGHT.

(From our own Correspondent.)

Messrs. Day, Summers & Co., Ltd., Northam Ironworks, Southampton.—The firm have a large amount of work in hand. A lot has been completed during the past month and handed over last month. The firm are now building a steam yacht which the firm are building for Mr. Frank Bibby, is now in frame and the work on the machinery is well advanced. The new yacht will be called *Fiona* as was Mr. Bibby's last one, which latter is at present occupied the property of the firm. Her name will be changed when she comes to the firm's yard. Messrs. Day have placed a repair order with the firm for a steam tugboat of 56 ton to replace the *Dee Bay*, which was lost in a gale off Start Point. The firm have also booked an order for a [illegible] floating dock on their enclosed slipway for Messrs. C. H. Walker & Co. There are the usual set of docks which have been built for the same client, the position of being constructed to deal with [illegible]. The firm are very busy with fitting and painting work on several yachts. The s.s. *Zambesi* (ex-*Ivan*) has been sold and left the yard. A large amount of work has been carried out on the hopper [illegible] and *Mersey* belonging to Messrs. Lockyer Jones & Kelton. The s.s. *Ivan* (now ex-*Kelvin*) has been sold for South America and a sister vessel the s.s. *Rio Sao Mateus* (ex-*Clyde*) and shortly to follow. Extensive repairs were carried out on both vessels.

Messrs. J. Samuel White & Co., Ltd., East Cowes, Isle of Wight.—Last month the firm completed and despatched three launches for service in South American waters. Hands are busily engaged upon the British and Chilian destroyers and the plating of the London County Council's firefloat *Delta* is nearing completion. There is an extensive commitment in British and foreign steam and motor craft and a number of spare boilers, crude oil engines and auxiliaries are in process of construction for despatch to British Colonial and Continental orders. The [illegible] last month for overhaul, the s.y. *Onora* was undergoing survey and the *Lorna* was dipped for survey.

Messrs. Simpson, Strickland & Co., Dartmouth.—This firm are busy in all departments and have [illegible] their machinery in hand. [illegible] launch with cabin accommodation. She is to be fitted with triple engine and water-tube boiler and is for a French owner. A [illegible] long with [illegible] on local account [illegible] for the White Star Line [illegible] machinery for Ireland, and a [illegible] oil engine are well advanced. The [illegible] launch for the [illegible] and the [illegible] machinery for [illegible] A good deal of [illegible] for the [illegible] steam machinery to replace [illegible].

The White Star Line.—The *Majestic* will shortly resume her sailings to the Continent of New York [illegible] the *Teutonic* and was to have gone in [illegible] but [illegible] to the Scottish [illegible] will take the sailings allotted to the *Majestic*. The Olympic [illegible] fortunate in the period [illegible] all the time she took part in the [illegible] the *Titanic* survivors. The [illegible] there was some talk of the likelihood of the ship being laid up again. Persons not on business were totally excluded from the docks.

THAMES.

(From our Own Correspondent.)

Shipping Companies. The movement in the shipping trade of the port continues to be of a very important character. Following on the transfer of the Union Castle Line to the Royal Mail combination, for which a cheque for over five million pounds was drawn recently there have been phenomenal dealings in the P. & O. Co.'s shares through the past month. The deferred shares of this Company reached the [illegible] of [illegible] points in a few days. Working arrangements with other Companies have been assumed to be the cause of the dealings, but it has turned out that the Company intended to issue the balance of their capital [illegible] for further developments. Probably there will not now be the fluctuations there have been recently in this stock. The Royal Mail Co. have issued a prospectus which gives [illegible] for the purchase of new vessels. An order has been given to Messrs. Barclay, Curle & Co., of Glasgow, for a passenger and cargo steamer to be used on the East Coast service of Africa by the Union Castle Line where, under the new management, there will be no change of staff whatever at the head office of the Company.

Labour Troubles.—With the sinking of the *Titanic* there have sprung up demands of all sorts by the *personnel* of the Companies. One is that a representative of the Union be present at the signing on by the men. The P. & O. and the Orient lines are the Companies chiefly affected. The latter Company, however, appear to have satisfied the men. A further point was as to the number of European sailors for manning the boats. This will be seen to be a large question not easily settled, as many vessels are fitted for carrying Lascar crews and alterations are not readily possible. These agitations are the outcome of the disasters to which liners have lately been subject. There is not only the *Titanic* case, but those that the P. & O. have had in a smaller way. However, a solution is likely to be made in view of the great issues that have arisen in this direction and with which everyone is unhappily familiar, and reference therefore unnecessary.

London's New Dock.—The King has appointed July 17th as the date for inaugurating the extension of the Royal Albert Dock. The first contract will cover constructional operations and will cost £1,500,000. The new electrically-driven pumps will be in operation this summer and comprise three 76-in. suction pumps delivering through six 50-in. pipes with a capacity of 280,000 gallons a minute. The water level will thus be maintained to 38 ft. The level of the present Albert Dock will be raised to 29 ft. 6 in. and the Victoria Dock to 28 ft. Vessels will then be able to remain at their berths up to sailing time instead of having to finish their loading in the Albert Dock Basin, a great improvement, as will be seen, the levels being raised 2½ ft. thereby.

The City Bridge Proposals.—At a dinner given by the Bridge House Estates Committee of the Corporation it was said by the chairman, Mr. Domoney, that the alterations to Southwark Bridge would be begun almost immediately, and it was hoped they would be completed in 2½ years, after which the construction of St. Paul's Bridge would be taken in hand. From this statement it is clear all differences have been settled and the work is therefore to proceed at once.

MERSEY AND MANCHESTER SHIP CANAL.

(From our Own Correspondent.)

APART from the engineers' strike, which unfortunately still remains at the time of writing unsettled, and the distress which has resulted in the district as a consequence, times are very prosperous.

Messrs. Cammell, Laird & Co.—Great activity prevails at the Birkenhead and Tranmere yards both upon Admiralty and mercantile work. An order has recently been placed with this firm by the Isle of Man Steam Packet Company for a fast cross-Channel steamer for early delivery. The vessel may be an improved winter boat like the *Snaefell* or a summer boat similar to the *Ben-ma-Chree*, and will accommodate from 1,500 to 1,600 passengers. Parsons turbines will drive twin screws by means of gearing, thus obtaining the highest efficiency both for turbines and propellers. Steam will be supplied by three Scotch boilers working under forced draught and the vessel is expected to have a sea speed of 21 knots. Wireless telegraphy will be installed and it is understood that all the I.O.M. Co.'s boats are to be so fitted. The first Norwegian Atlantic liner is now being plated, while good progress is being made with the machinery. The second boat is also making good progress. The *Dart* steam propelled meat barge for the Royal Mail Co. is also ready for launch. The L. & N.W. Railway Co. steamer *Greenore* is now being completed in the wet dock and with the two funnels presents a very smart appearance. The *Lysander*, H.M. Destroyer is now being prepared for acceptance trial, as is also H.M. Tender *Alectro*. The Australian cruiser is expected to be launched early in June about which time it is reported the floating dock for Portsmouth will also be ready. Amongst a large amount of repair work in hand are the s.s. *Kenmare* for new boilers, the *Dunstan* and *Hesiom* for bottom damage the Midland Railway steamer *Intrim* and several Isle of Man and North Wales steamers.

Messrs. H. & C. Grayson.—This firm have been busy with their usual varied run of work. The *Lake Champlain*, has resumed her sailings after having a new stern frame and other extensive repairs. The Great Western steamer *Great Southern* and others have arrived for general repairs, while the London steamer *Durango* has had ice damage repairs. At their South End Works great activity prevails upon the making of life rafts and other appliances for life saving.

Messrs. Clover, Clayton & Co. have had all their docks well occupied, and various important repair jobs are in hand. Messrs. David Rollo & Co. have also had all their departments fully occupied.

The Mersey Docks and Harbour Board.—Mr. David Ross Dean has retired after holding the position of South Assistant Harbour Master for thirteen years, having joined the Board's service about 1885. Mr. Robert Parry has been appointed to the vacant post, having relinquished the position of chief pilot to the American Line thirteen years ago to become master of the Brunswick Dock and afterwards the Langton system of docks.

Wireless Telegraphy at Liverpool University.—Thanks to the generosity of Sir Wm. Hartley, this University has recently been equipped with an efficient wireless installation. The chief purpose of the plant is for experimental and research work of an advanced nature. Owing to the fact that the Post Office limit the amount of power sent out of a station, the transmitting range is not more than sixty miles. Timing coils and a wave meter have been fitted, thus enabling any signals to be picked up. Messages have been received from the Eiffel Tower, having travelled the 400 miles in 1/500th part of a second. There is only one other college in this country possessing a wireless installation namely, the Central Technical College, London.

The New Harrison Hughes Laboratories.—These new laboratories, having been completed at a cost of £40,000, were formally opened at Liverpool University on May 18th by Lord Haldane. Mr. Heath Harrison formally handed the buildings over on behalf of the donors, the Chancellor, Lord Derby, accepting the same on behalf of the University. The donors are Messrs. T. F. Harrison, J. W. Hughes and H. Harrison. The installation consists of three gas engines together with six oil engines, amongst which are a Diesel engine of 50 h.p. and a semi-Diesel Blackstone engine. Powerful air compressors and four different types of gas producers are installed. Four rooms have been fitted up for fuel testing and gas analysis. A tank holding 10,000 gallons has been fitted together with elaborate hydraulic machinery. The comfort of the students and the general efficiency of the drawing and designing section has been carefully considered, and the whole has been conceived with the object of keeping Liverpool not only abreast and in advance of other colleges in the country but also of Germany and other keen rivals.

NORTH-WEST OF ENGLAND.

(From our Own Correspondent.)

Barrow-in-Furness.—The shipbuilding of this district remains very actively employed in all its departments. Over 15,000 men are working in the several departments of Messrs. Vickers, Ltd., and if the firm could secure the services of all the men they need there would be 5,000 more men employed. There are two difficulties in the way—first of all

[illegible] roomed house. This scarcity of house accommodation will [illegible] house accommodation in the borough is exercising the minds [illegible] of the town.

H.I.J.M.S. "Kongo."—This battle-cruiser, built by Messrs. Vickers, Ltd., [illegible] battle-cruiser is about 1,000 tons more displacement than the British vessel, but she has two knots less speed.

H.M.S. "Princess Royal."—The work of alteration to the *Princess Royal* [illegible] in her sister ship the *Lion*, is engaging considerable attention [illegible] larger funnels which are being erected so as to avoid the great heat [illegible] The alterations are numerous, and it is expected it may be July or August [illegible] had not been for the necessity of these alterations the *Princess Royal* [illegible] two up-to-date 27,000 battle-cruisers lying alongside of each other, a British and a Japanese vessel.

H.M.S. "Delhi."—Preparations are in progress for laying the keel of [illegible] yard. Much of the material necessary for this purpose, and [illegible] laid for the reception of the keel plate. [illegible] completion of the orders in hand from time to time is managed. [illegible]

The Montreal Floating Dock.—This huge floating dock to lift 27,000 tons, is rapidly approaching completion, and it is [illegible] will lift several thousand tons more, and it is probable [illegible] that future floating docks to be constructed will have even [illegible]

The Turkish Battleship "Reshad V." [illegible] two years from the time when her keel was laid. [illegible] ditions, but as they have so many large orders in [illegible]

Brazilian Orders.—The work has been commenced at Messrs. Vickers' [illegible]

Submarines.—Messrs. Vickers, Ltd., [illegible] man them.

Engineering Work.—The marine engineering [illegible] not only are the [illegible] the two Chilian battleships building [illegible]

Shipbuilding Material. [illegible]

BELFAST.

(From our own Correspondent.)

Orders for Lifeboats.—There are five or six liners approaching completion in Belfast, and all these vessels will be equipped with additional lifeboats, giving accommodation for all on board in time of any emergency.

Messrs. Harland & Wolff have launched a further addition to the [illegible]

Messrs. Workman, Clark & Co.—On the same day on which the *Darro* was launched, this firm sent from the stocks the new Lamport & Holt liner *Vestris*. She is 511 ft. long, with a [illegible] vessel was recently put through a successful trial trip, as was [illegible] mishap, one of the tugs in attendance fouling and damaging [illegible] tonnage [illegible] supplied with steam by two double-ended boilers.

Ulster Steamship Co., Ltd.—The launch of a new steamer [illegible] month's issue. She was built by Messrs. Irvine's Shipbuilding and Dry Docks Co. [illegible] trip in Hartlepool Bay. The propelling machinery has been supplied and fitted by Messrs. [illegible] Ltd.

Messrs. Harland & Wolff are credited with having acquired the [illegible]

The "Titanic" Relief Fund. [illegible] Harland & Wolff.

OBITUARY.

Gilbert Smith Goodwin.

LIVERPOOL has lost one of its oldest and best known consulting engineers by the death of Mr. Gilbert Smith Goodwin, which occurred on April 29th at his residence, "Rockville," Anfield Road, Liverpool, in his 82nd year. Mr. Goodwin, born February, 1831, in Glasgow, was the son of John Goodwin. He received his education at private schools, and was apprenticed with Messrs. John Holiday & Co., machinists, millwrights, etc., Glasgow, on August 4th, 1845, and served in their workshops and drawing office till March, 1852. This was followed by a period in the workshops of Messrs. Coats & Young, engineers, Belfast, remaining there until September, 1852, after which he went to Messrs. George Forrester & Co., engineers, Liverpool, for a short time. He then became chief assistant to Mr. Douglas Hebson, consulting engineer and naval architect, Liverpool, who was also chief engineer-surveyor to the

Mr. Gilbert Smith Goodwin.

Board of Trade, he (Mr. Goodwin) serving as his assistant-surveyor by direct appointment of the Board of Trade until 1856, when exclusive surveyors to the Board were appointed. Mr. Goodwin continued service with Mr. Hebson, designing and superintending the building of ships and machinery for river and lake navigation, Atlantic passenger and other trades, till January, 1864, when he was appointed Chief Surveyor to the Liverpool Underwriters' Registry for Iron Vessels, remaining in that position until May, 1866, when he began business in Liverpool as consulting engineer and naval architect, and became engaged in designing and superintending the building of a great number and variety of vessels. From the first, Mr. Goodwin was connected largely with steamers engaged in the American cattle trade. He was also one of the pioneers in the compounding of the steam engine, being instrumental in fitting annular compound cylinder engines to the *José* and *Rita*, of the Serra Line, of Liverpool, about 1866. He also had the building of the *Good News* for the London Missionary Society. This boat was built in sections of not more than 60 lbs. weight for shipment to Lake Tanganyika, Central Africa, it being the first steam craft to be placed thereon. While conducting his own business, he concurrently held the position of Chief Surveyor for the United Kingdom to the Bureau Veritas Register of Shipping from 1868 till 1886, and was consulting and resident engineer to various important English and foreign ship lines, including the Laninaga Co., the Serra Line, the Knight Steamship Co., etc. In 1896, Mr. Andrew Hamilton, M.I.N.A., and Mr. W. F. Lambert, M.I.M.E., were taken into partnership, and later Mr. Alexander Adamson also became a partner. Mr. Goodwin was well known for the interest he took in philanthropic and charitable institutions, having for many years shown a very practical interest, among other things, in the welfare of the Hahnemann and Stanley Hospitals. He was also for upwards of twenty years, President of the North End Y.M.C.A. His religious sympathies were very broad, but in actual profession he had identified himself with the Congregational body, and for many years had been a director of the London Missionary Society and an active member of Norwood Congregational Church, Liverpool. He took a keen interest, though not an active part, in his business up to the last, and his personality will be missed by a large circle of the profession and friends in the Mersey district. Mr. Goodwin was predeceased by his wife about five months ago, and leaves surviving one daughter and several grand-children.

The Late Colonel J. Goffey, V.D.

We regret to announce the death, which occurred on April 24th, of Colonel Goffey, one of the best-known figures in local shipping circles.

He commenced business in 1867 with his brother as forwarding agents. He was a past chairman of the Liverpool Shipowners' Association and was the Liverpool Steam Shipowners' Association representative on the Shipowners' Parliamentary Committee. He was a director on the boards of several underwriting concerns, and a member of council of the Liverpool Chamber of Commerce. Colonel Goffey joined the 6th Liverpool Volunteer Artillery in 1865, and had held command of the corps for some time when he retired in 1892.

THE "NEVSINK" LIFE-SAVING JACKET.

THE recent tragedy of the *Titanic* has aroused in the mind of the public a special interest in life-saving appliances, and every device having claims for efficiency of floating power and ease of application to the person is deserving of serious consideration.

We have pleasure in describing and illustrating the "Nevsink" life-saving jacket, which has been invented by a Mr. Carroll, and which is manufactured by The Carroll Life-saving Jacket Company, of 8, Leadenhall Street, London, E.C.

The shape of the jacket is shown in Fig. 1 of the adjoining illustrations, and is of the size of an ordinary lounge jacket. It is provided with a series of vertical compartments carried on a framework of canvas. Instead of using cork as the buoyant material, a new product named "Kapok" is employed, which has a greater buoyancy than cork, and each compartment is packed with this material. In order to prevent the head of the person sinking under the water from unconsciousness or otherwise, the shoulders are provided with a pillow-like arrangement.

The supporting power of the jacket is very great, thus enabling the wearer to stand in deep water with hands and arms quite free for doing work. This is distinctly useful in many ways, and the attention of the War Office has been directed to it, from whom, we understand, the Company has received a reply.

In the upper part of the jacket above the water line pockets for holding food and other materials are provided, so that the person has some opportunity of maintaining the bodily heat by taking food in the event of an immersion of long duration. Recently a demonstration was given by Mr. Carroll and his daughter in the river Thames before mem-

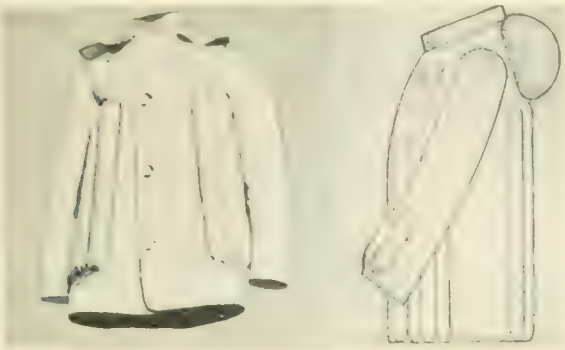


Fig. 1.

bers of the House of Commons, who were standing on the terrace. During the exhibition it was conclusively shown that a person could float comfortably without any personal effort and by means of the jacket alone, and could calmly eat and drink without difficulty, as the head and shoulders were well out of the water.

It would seem that the objections due to the small practical value of the lifebuoy, except to those who can swim, and to the inefficiency of the ordinary cork jacket unless fastened in the right place, are overcome by the "Nevsink" jacket. Further, the risks

Fig. 2.

with these old appliances of the wearer losing consciousness or muscular power, and the head thus becoming submerged and consequent drowning taking place, are entirely overcome by the new design. It will be noted that there are no cords or fastenings which can become loose in emergency, and an important additional point is that the jacket protects the wearer from cold to a considerable extent.

LAUNCHES AND TRIAL TRIPS.

LAUNCHES. English.

Newtownards. On April 3rd, there was launched at Sunderland a steel steamer built to the order of Mr. D. N. Greene, of Stokes Bay, on behalf of the Marquis of Londonderry. The vessel is designed to carry a deadweight of about 1,000 tons on a light draught, and will be fitted with machinery by the Northeastern Marine Engineering Company, Ltd., Sunderland Marine Works, Dove & Co., "Blyth," [illegible] has been applied to the time by under the [illegible].

West Wales. On April 3rd, the Pembroke Shipbuilding and Dry Docks Company, Ltd., launched from their shipbuilding and graving dock works the [illegible] cargo steamer Hope Hope, built to the order of Messrs. Griffith & Co., of Cardiff. This vessel, which measures [illegible] ft. extreme breadth, [illegible] has been constructed to Lloyd's Highest class under special survey. She is of the single deck type with longitudinal forecastle bridge and [illegible] aft. Accommodation for officers will be provided in [illegible] with a house for the captain on top of the bridge, the engineers' accommodation being [illegible], and the crew will be berthed in [illegible]. The vessel is specially adapted for the general cargo and wood trade, and shifting boards are fitted throughout for carrying of grain. Efficient deck machinery of the best and latest design, including five 6 in. by 10 in. and three 7 in. by [illegible] in. steam winches, will be supplied by the [illegible] 20 in., [illegible] in. and 7[illegible] in. by [illegible] in. stock, [illegible] by Messrs. Blair & Co., Ltd., of Stockton. The vessel is being constructed under the supervision of Mr. [illegible].

Balfour. On April 4th, there was launched from the yard of Messrs. Cochrane & Sons, Selby, a steel steam trawler, the principal dimensions being [illegible] ft. by [illegible] ft. by [illegible] ft. 6 in. moulded. The vessel has been built to the order of Messrs. Pickering & Haddock's Steam Trawling Co., Ltd., Hull, and will be replete with all the latest improvements for the fishing trade. She will be fitted with powerful triple-expansion engines by Messrs. C. D. Holmes & Co., Ltd., Hull.

Cordelia.—On April 4th, Messrs. Swan, Hunter & Wigham Richardson, Ltd., successfully launched from their Wallsend yard a steel two-decked tank steamer built to the order of the Oil Tank Steamship Company, Ltd., of Liverpool (Messrs. C. T. Bowring & Co., Ltd., managers). The construction of the eleventh ship Messrs. Swan, Hunter & Wigham Richardson have built for Messrs. C. T. Bowring & Co., and they also have other vessels in hand for them. The ship has been constructed on the longitudinal system of the general trade. The overall dimensions are :—Length, 4[illegible] ft., [illegible] ft. and moulded depth, 32 ft. 8½ in. The deadweight carrying capacity is about [illegible] tons. The upper [illegible] and also the boilers, are being built by the Wallsend Slipway and Engineering Company, Ltd., and will be placed in the after part of the vessel [illegible] the deadweight carrying compartments [illegible]. The [illegible] is the largest oil tank steamer built on the Tyne. [illegible] There are seventeen transverse bulkheads, [illegible] bulkheads divide the vessel into ten main compartments, [illegible] There will be an installation of electric light throughout the ship.

Ranella. [illegible] Wallsend shipyard of Messrs. Swan, Hunter & Wigham Richardson, Ltd., the [illegible] Messrs. [illegible] built primarily for carrying oil in bulk. The [illegible] Messrs. [illegible] Ltd., of London. The [illegible] Swan, Hunter & Wigham Richardson have built for these owners and they have also in hand for them. The vessel is [illegible] [illegible] and provided [illegible] to carry [illegible] tons [illegible] ft. [illegible] carrying [illegible] tons deadweight. The forward hold of the vessel is [illegible] to carry general cargo. The other holds [illegible] built

oil tight to carry benzine or petroleum in bulk, though they can be used for general cargo if required. In every compartment where oil is carried there is a permanent steaming out arrangement, so as thoroughly to clean and disinfect those parts of the ship. The ship is divided by thirteen oil-tight and two watertight transverse bulkheads. At each end of the series of oil compartments there is an oil-tight cofferdam. The engines and boilers, which will be placed at the extreme end of the ship, are being constructed by the Wallsend Slipway and Engineering Company, Ltd.

Cattaro.—On April 16th, there was launched from the yard of Earle's Shipbuilding and Engineering Co., Ltd., Hull, a finely modelled steel screw steamer. The vessel, which is named the *Cattaro*, is built to the order of Messrs. Thos. Wilson, Sons & Co., Ltd., and is intended for the Mediterranean and Baltic trades. The length of the vessel is 300 ft., breadth, moulded, 44 ft. 6 in., depth moulded, 26 ft. She has been constructed of steel throughout to the British Corporation highest class, and to the latest Board of Trade requirements. The vessel is of the shelter-deck type with saloon deck house amidships, in which are situated the officers' rooms, the engineers being berthed in side houses abreast the engine casing. She has two steel pole masts and very efficient appliances for the speedy handling of cargo, the derricks, ten in number, being capable of dealing with heavy lifts. The derricks will be worked by powerful steam winches of the most up-to-date description, and a latest improved steam windlass by Messrs. Emerson, Walker and Thompson is also fitted. The steering engine is placed in the deck house aft and is controlled by the telemotor system from the navigating bridge, powerful hand-screw gear is also combined with the steam steering engine, both of which have been supplied by Messrs. Amos & Smith, Hull. The work throughout the vessel is of the very best description, with all the latest improvements. Triple expansion engines are provided by the builders, steam being supplied by two large steel boilers designed to drive the vessel at a good speed on a minimum coal consumption.

Prosper III.—On April 16th, there was launched from the yard of The Sunderland Shipbuilding Co., Ltd., a handsomely-modelled steel screw steamer, built to the order of Messrs. Hans Kiaer & Co. The vessel is built on the Isherwood system of longitudinal framing, her principal dimensions being:—Length, 375 ft.; breadth, 50 ft. 9 in., and depth moulded, 28 ft. 6 in. She is of the single-deck type, with poop bridge, and forecastle and will take Norske Veritas highest class under special survey. The deadweight carrying capacity is about 7,400 tons on a light draught. Accommodation for captain, officers and engineers is provided on bridge deck, the whole being heated by steam. A large saloon in polished hardwood is also fitted in the bridge house. The crew and firemen are accommodated in the forecastle as usual. The deck machinery, which is worked by a large multitubular donkey boiler, consists of eight steam winches, by Messrs. Clarke, Chapman & Co., Ltd., steam windlass and a steam-steering gear placed at after end of engine-room. Ample provision is made for the quick discharge of cargo, and the holds are almost entirely free from pillars. The main engines are by the North-Eastern Marine Engineering Co., Ltd., Sunderland, and have cylinders 25 in., 42 in., 68 in. by 45 in. stroke, steam being supplied by two large boilers working at a pressure of 180 lbs. per square inch.

Zvir.—On April 16th, Messrs. Robert Thompson & Sons, Ltd., launched from their Southwick yard the first-class finely-modelled cargo steamer *Zvir*, of Fiume. Her principal dimensions are:—Length overall, 364 ft.; breadth extreme, 50 ft. 10 in., and depth moulded, 24 ft. She will take the highest class at Lloyd's, and is of the single-deck type, with a full poop, cargo bridge amidships, 215 ft. long, and topgallant forecastle where the crew are comfortably berthed. Ample water ballast is provided in the cellular bottom and after-peak tank. The cargo holds, clear of all obstructions, are divided by a centre longitudinal steel bulkhead, with five cargo hatchways having double derricks fitted on tables with cross-trees at masthead, also derrick posts to poop and bridge hatches, all arranged for rapid loading and discharging, and worked by powerful steam winches. A large multitubular donkey boiler of ample capacity will supply steam to deck machinery. Accommodation is provided in a large steel house on the bridge deck for the captain, steward, spare room, officers' mess-room and dining saloon, the latter being tastefully fitted up in oak. Spacious rooms for the engineers, officers, petty officers and apprentices, with mess-room, bath-room, etc., are situate in steel houses at the sides of the engine casing. The engines by The North-Eastern Marine Engineering Co., Ltd. Sunderland, have cylinders 24½ in., 40 in. and 66 in. with a stroke of 45 in., steam being supplied by large boilers working at a pressure of 180 lbs. per square inch. Messrs. Wailes, Dove & Co.'s "Brunnastic" enamels have been applied to the lower side bunkers, tank top, etc.

The trial trip was run very successfully on May 14th, the engines running with the utmost smoothness, and after a five hours' run, including six consecutive runs on the measured mile, a mean speed of 11½ knots was easily attained.

Exmoor. On April 16th, there was launched from the shipbuilding yard of Messrs. John Readhead & Sons, Ltd., West Docks, South Shields, a steel screw steamer, built to the order of Messrs. Walter Runciman & Co., Newcastle-on-Tyne. The vessel is of the improved single deck type, and is built to Lloyd's highest class, and under their special survey. She is 375 ft. in length by 51 ft. by 28 ft. 9 in., with poop, long extended bridge, and topgallant forecastle, and is fitted throughout with shifting boards and grain feeders in compliance with the requirements of the Grain Loading Act, and well equipped with a large number of steam winches and derricks for the rapid handling of cargoes. Steel houses are constructed on the bridge-deck for accommodation of Captain and officers, engineers and apprentices. She has a double bottom for water ballast, as well as a large after-peak tank. The vessel will be fitted with triple-expansion engines, also constructed by Messrs. John Readhead & Sons, Ltd., having cylinders 26 in., 42 in. and 69 in. with 48 in. stroke, steam being supplied from two large steel boilers of 180 lbs. pressure. There is also a large marine-type donkey boiler. She has been constructed under the supervision of Mr. W. P. Henry and Mr. N. Blatchford, owners' superintendents, and is the twenty-second vessel built for the above firm by Messrs. John Readhead & Sons, Ltd.

Fishpool.—On April 16th, Messrs. Ropner & Sons, Ltd., Stockton-on-Tees, launched from their shipbuilding yard a steel screw steamer of the following dimensions, *viz.*:—Length 392 ft. 6 in.; breadth, 56 ft.; depth, 26 ft. 9 in. The vessel will be classed 100 A1 at Lloyd's, having main deck, poop, long bridge and topgallant forecastle. Accommodation for captain, officers and engineers in houses on bridge deck, crew in the forecastle. The vessel has double bottom for water ballast on the cellular principle, and in fore and after peaks. She will be fully equipped with an up-to-date outfit, including quick-warping windlass, stockless anchors, steam-steering gear amidships and powerful screw gear aft. The appliances for loading and discharging cargoes expeditiously are very complete, and include ten steam winches, double derricks to each hatch, steam being supplied by a large donkey boiler, working at 100 lbs. pressure per square inch. The engines will be of the triple-expansion type by Messrs. Blair & Co., Ltd., Stockton-on-Tees, of about 2,450 I.H.P., having three steel boilers 14 ft. 9 in. by 11 ft., 180 lbs. pressure of steam.

Burma.—On May 16th, Messrs. William Gray & Co., Ltd., launched the handsome steel screw steamer *Burma* for the Societa Anonima Ungherese di Armamento Marittimo, Fiume. She will take the highest class in Lloyd's Register, and is of the following dimensions:—Length overall, 412 ft. 6 in.; breadth, 52 ft. 3 in., and depth, 27 ft. 7 in., with two decks laid and extra long bridge, poop and topgallant forecastle. The saloon, state-rooms, captain's, officers' and engineers' rooms will be fitted up in houses on the bridge deck, the petty officers' rooms in the fore end of bridge and the crew's berths in the forecastle. The hull is built with deep bulb-angle frames, large clear holds, cellular double bottom and large fore and after-peak ballast tanks, and in addition there is a deep tank or hold compartment fitted forward of the engine room giving a total capacity of about 2,300 tons for water ballast, nine steam winches, twelve derricks, steam-steering gear amidships, hand screw gear aft, patent direct steam windlass, steel shifting boards, boats on deck overhead, stockless anchors, telescopic masts with fore and aft rig and equipped as a first-class cargo steamer. Triple-expansion engines are being supplied by the Central Marine Engine Works of the builders, having cylinders 26 in., 42 in. and 70 in. diameter, with a piston stroke of 48 in. and three large steel boilers for a working pressure of 180 lbs. per square inch.

Harden. On April 17th, Messrs. William Gray & Co., Ltd., launched the steel screw steamer *Harden*, which they have built for Messrs. Harrison, Tidswell & Co., London. She will take the highest class in Lloyd's Register and is of the following dimensions, viz.:—Length overall, [illegible] ft. [illegible] in.; breadth, 36 ft. 3 in., and depth, 19 ft. 10 in., and is specially constructed for the London coal trade. She is a handsomely modelled vessel of the single-deck type with raised quarter deck, bridge and topgallant forecastle. Tasteful cabin accommodation will be fitted up in the bridge for captain, officers and engineers and the crew in the forecastle. The hull is built with deep bulb-angle frames, clear holds, cellular double bottom and large fore and after-peak ballast tanks. She has four extra large hatchways for loading and self trimming all parts of the holds. There are four powerful steam winches placed on raised platforms with the usual derricks for rapidly discharging coal, the masts being extra strong to carry all the required gear; special arrangements are also provided for discharging by shore grabs. Steam-steering gear is fitted amidships, hand-screw gear aft, patent direct steam windlass, stockless anchors, telescopic masts with fore and aft rig, and a first-class outfit for the vessel's special trade. The machinery is made by The Central Marine Engine Works of the builders, being of the triple expansion type, with cylinders 19 in., 30½ in. and 51 in. dia. with a 36-in. piston stroke, and is fitted with two large steel multitubular boilers to work at a pressure of 180 lbs. per square inch.

Aysgarth Force.—On April 18th, there was launched from the yard of Messrs. R. Williamson & Son, Workington, a steel screw steamer for Liverpool owners of the following dimensions:—Length, 103 ft. 9 in.; breadth, 26 ft. 6 in.; depth, 13 ft. 2 in. She is designed to carry about 750 tons deadweight on Lloyd's freeboard. This vessel is built to the highest class at Lloyd's, and will be propelled by triple-expansion engines, having cylinders, 14 in., 22½ in. and 37 in. diameter by 27 in. stroke, steam being supplied by a cylindrical steel boiler 13 ft. 6 in. diameter by 10 ft. long, working at a pressure of 160 lbs.

Rondo.—On April 18th, there was launched from the shipbuilding and repairing establishment of Messrs. S. P. Austin & Son, Ltd., at Sunderland, the steel screw steamer *Rondo*, classed 100 A1 in Lloyd's Register, which has been built to the order of Messrs. R. S. Gardiner and Joseph Reay, of the Pelton Steamship Co., Ltd., of Newcastle and London, this being the sixth vessel constructed at this yard for the same owners. The vessel has been specially built for the owners' coal trade on the deep frame principle, leaving the holds entirely free for cargo; will carry about 2,750 tons deadweight on a light draught of water; is adapted for quick loading and discharging; is fitted with five powerful steam winches, direct steam grip windlass, steam-steering gear, and electric light. Accommodation for captain is provided in the poop, officers and engineers amidships, and for the crew in forecastle. The machinery will be supplied by Messrs. George Clark, Ltd., Sunderland. The construction has been superintended by Mr. A. Daniels, on behalf of the owners. A Cochran (Annan) donkey boiler with patent seamless furnace has been fitted.

Standish Hall.—On April 19th, Messrs. Wm. Doxford and Sons, Ltd., Sunderland, launched a large single-deck vessel, built to the order of Messrs. Edward Nicholl & Co., Cardiff, for whom Messrs. Doxford have already built several vessels. The dimensions are:—Length, 361 ft.; breadth, 50¾ ft., and moulded depth, 28 ft., carrying 7,000 tons deadweight on moderate draught. The classification is with the British Corporation. Messrs. Doxford are supplying the engines and boilers. A successful trial trip was run on May 11th, when a mean speed of 12 knots was attained. Captain Reed represented the owners.

Bonar Law.—On April 20th, there was launched from the yard of Messrs. Cochrane & Sons, Selby, a steel screw trawler, the principal dimensions being [illegible] ft. 4 in. by [illegible] ft. by 12 ft. 9 in. moulded. The vessel has been built to the order of Messrs. Pickering & Haldane's Steam Trawling Co., Ltd., of Hull, and will be replete with all the latest improvements for the fishing trade. She will be fitted with powerful triple-expansion engines by Messrs. C. D. Holmes & Co., Ltd., of Hull.

Steel Screw Steamer.—On April 29th, the Northumberland Shipbuilding Co., Ltd., launched from their yard at Howdon-on-Tyne a small steel screw steamer. The vessel is [illegible] ft. long by [illegible] ft. beam, and is built under the rules of Lloyd's Register, being [illegible] steel and long range, long poop, topgallant forecastle, accommodation, [illegible] hatches on the large deck. The tween decks are fully and [illegible] strongest that cattle, [illegible] if necessary. Very special attention has been paid to the loading and discharging gear and a complete outfit for the rapid handling of various articles of [illegible] cargo, for Messrs. Gibbs, Cunningham & Co., Ltd., Gateshead-on-Tyne, a large portion of cargo being [illegible] and stores [illegible]. She is fitted with the usual water ballast arrangement in the hold [illegible]. The machinery and boilers are supplied by Messrs. [illegible], Ltd., Sunderland, consisting of [illegible] cylinders 19 in., 31 in. and [illegible] in. by 18 in. stroke, [illegible] and boilers suitable for [illegible] lbs. pressure.

Trentwood.—On May 1st, Messrs. W. Harkess & Son, Ltd., launched the steel screw steamer *Trentwood* from their yard at Middlesbrough. This vessel has been built to the order of Messrs. The Meteor Steamship Co., Ltd., of Middlesbrough (Messrs. R. A. Constantine & Dearling, managers), and is specially designed for their coasting trade. Her dimensions are: 108 ft. by [illegible] ft. by [illegible] ft., and she is built to Lloyd's highest class and equipped with a full complement of deck machinery, including double windlass, [illegible] hatchways and double derricks, [illegible] to handle every description of cargo with. [illegible] deadweight. She has very large hatchways and large [illegible] specially for the general cargo trade, and she will draw about 1,[illegible] tons on a very light draught of water. Her engines are being fitted on board by Messrs. Ross & Co., Ltd., of Stockton-on-Tees, and will give her a speed of [illegible] knots loaded. The vessel has been built under the superintendence of Mr. William Constantine.

Novington.—On May 4th, Messrs. Richardson, Duck and Co., Ltd., launched from their yard a steel screw steamer of the following dimensions:—Length overall, [illegible] ft., breadth extreme, [illegible] ft., depth moulded, 24 ft., gross tonnage, about 3,150. This vessel, which has been built to the order of the Scottish Steamships, Ltd., of London (Messrs. Bell, Symon & Co., managers), will class 100 A1 in Lloyd's Register and has been built under special survey, and under the superintendence of Mr. [illegible] on behalf of the owners. She is of the single-deck type with clear holds, both beams and quarter pillars being dispensed with. She has a cargo poop, long bridge extending from bow to foremast to aft main mast, and a topgallant forecastle, and has been designed to carry a deadweight of [illegible] tons on about 21 ft. mean. Accommodation for captain, officers and engineers is provided in large [illegible] on bridge deck, the crew being lodged in topgallant forecastle. A cellular double bottom all fore and aft and fore and after-peak tanks are fitted for water ballast, and equipment includes six steam winches, [illegible] horizontal multitubular donkey boiler, eleven derricks, steam windlass with quick-warping ends, stockless anchors, steam warping gear, etc., etc. The engines by Messrs. [illegible] Co., Ltd., have cylinders 23 in., 31 in., 57 in. by 42 in. stroke, steam being supplied by two single-ended boilers having a working pressure of 175 lbs.

LAUNCHES—Scotch.

Kopoola. On April 13th, there was launched at Greenock the steamer *Kopoola*, which has been built to the order of the Gulf Steamship Company, Ltd., of London. The principal dimensions are:—Length, [illegible] ft., breadth, [illegible] ft., and depth moulded, [illegible] ft. [illegible] in. The vessel is intended for service in the Gulf of St. Vincent.

Karamu. On April 18th, Messrs. [illegible] & Ferguson, Ltd., launched from their shipyard at Leith a steel screw cargo steamer of about 1,100 tons, which they have built to the order of the Union Steamship Company of New Zealand, Ltd., Dunedin, N.Z. The new steamer is [illegible] ft. length between perpendiculars by 32 ft. by 13 ft. depth

moulded, and is intended for the Company's general coasting trade in New Zealand. Built to Lloyd's highest class with raised quarter-deck, bridge-deck, long well forward and topgallant forecastle, the accommodation for officers is amidships under the bridge and the arrangements for working cargo and handling the vessel are of the most complete description; steam winches, steam and hand capstan aft, steam windlass, steam-steering gear are fitted, also a complete installation of electric light. Triple expansion engines of the builder's make are fitted, having cylinders 17 in., 27 in. and 45 in. diameter by 33-in. stroke, supplied with steam from two large boilers working at 180 lbs. pressure, and all suitable for a high rate of speed at sea for this class of vessel. This is the third steamer built by Messrs. Ramage & Ferguson for the Union Steamship Company of New Zealand.

Benefactor.—On April 22nd, there was launched from the shipbuilding yard of Messrs. David & William Henderson and Co., Ltd., at Partick, Glasgow, the large steel screw steamer *Benefactor*, of about 5,500 tons gross, which they have built to the order of Messrs. Thos. & Jas. Harrison, Liverpool. This addition to the already large fleet of vessels owned by Messrs. Harrison is 410 feet long between perpendiculars by 52 feet broad by 32 ft. 7 in. depth moulded, is classed in Lloyd's 100 A1 and fulfils the requirements of the Board of Trade for their passenger certificate. She is rigged as a two-masted schooner, and has an exceptionally large number of powerful derricks which, with ten steam winches, provide ample means for the rapid handling of large cargoes. Comfortable accommodation is provided on bridge-deck amidships for passengers, also for officers, engineers, etc., while the petty officers are berthed in the forecastle, and the crew in the poop. The machinery, which has been constructed by the builders, consists of triple-expansion engines having cylinders 24½ in., 42½ in. and 72 in. diameter by 54 in. stroke, with steam from three boilers at 215 lbs. pressure. The vessel and machinery have been constructed under the supervision of the owner's superintendent, Mr. R. D. Richardson, assisted by Mr. T. Sheriff. Messrs. Matthew Keenan & Co., Ltd., have completed the contract for the boiler and pipe coverings on board, with their Patent Non-conducting Composition.

Omi Maru.—On April 30th, there was launched from the yard of Messrs. Napier & Miller, Ltd., Old Kilpatrick, the steel screw steamer *Omi Maru*, built to the order of the Nippon Yusen Kaisha for their Eastern trade, through Messrs. A. R. Brown, McFarlane & Co., Ltd., Glasgow. The dimensions of the vessel are :—Length, 345 ft.; breadth, 46 ft.; depth, 28 ft. moulded, with a gross tonnage of about 4,000 tons, built to the rules of Lloyd's register for their highest class. Rigged as a two-masted schooner, the vessel has upper and shelter-decks, also topgallant forecastle and poop-deck, water-ballast in double-bottom. Accommodation for a large number of first-class passengers is provided for in state-rooms on the shelter-deck, with dining-saloon and smoke-room, also accommodation for third-class in 'tween decks aft. The vessel is fitted throughout with electric light and steam heating. The machinery is being supplied by Messrs. Dunsmuir & Jackson, Ltd., Govan, and consists of triple-expansion engines and two large main boilers and a donkey boiler, for a speed of 14½ knots. Messrs. Wailes, Dove & Co.'s "Bitumastic" enamel has been applied to the double-bottom bilges, etc., and their patent "Bitumastic" covering to the tank tops.

Sir Richard Awdry.—On May 2nd, there was launched from the yard of the Clyde Shipbuilding & Engineering Co., Ltd., Port Glasgow, a coal-carrying vessel embracing some noteworthy features not usual in the collier type of ship. The vessel is 275 ft. long, 44 ft. moulded beam, and 21 ft. 6 ins. moulded depth, and is built to the order of the Pekin Syndicate, Ltd., as the first of a fleet of such vessels to meet the special requirements of their Chinese trade. The vessel is designed for the rapid loading, discharging and transhipment of cargo, and has large hatches and open holds, and is fitted with eight Temperley transporters with the necessary powerful steam winches for this work. The engines are of the tri-compound type, having cylinders of 21 in., 33 in. and 57 in. diameter by 36 in. stroke, and are supplied with steam from two single-ended boilers 13 ft. 6 in. diameter by 11 ft. long, specially arranged and designed for burning the Company's anthracite coal, and with the Atlas patent balanced draught and hot-air economiser, and some of the special features in the engine room include a Contraflo condenser of the latest design, and independent air, feed and circulating pumps, and also an auxiliary condenser of the Morison Contraflo non-vacuum type. The vessel is fitted with electric light throughout, and the accommodation for the crew is of a superior description, arranged for European officers and Chinese hands, under the forecastle, bridge and poop-decks. A Porhydrometer has been fitted in the vessel, and she is in every respect of up-to-date design for her special duties in the East. The vessel has been designed and constructed under the supervision of Mr. Wm. Jas. Douglas, M.I.N.A., of 1, Fenchurch Avenue, London, E.C., the Company's superintendent, assisted by Mr. Thos. Weir, and to the classification of the British Corporation Registry.

Robert Vassall.—On May 3rd, Messrs. Wm. Simons & Co., Ltd., Renfrew, launched the barge-loading bucket dredger *Robert Vassall*, constructed to the order of the Taff Vale Railway Company. The dredger, which was put into the water complete with steam up ready for work, has been constructed under Lloyd's rules and special survey. The bucket ladder, which is constructed in accordance with the builders' latest practice and most improved form of girder work, is designed for dredging to a depth of 40 feet below water level. The buckets are of special design and strength for dealing with various descriptions of material. The nominal bucket-dredging capacity is 700 tons per hour. The vessel is propelled by one set of compound surface-condensing engines supplied with steam from two marine multitubular boilers constructed to Lloyd's requirements for a working pressure of 120 lbs. per square inch. The propelling engines are also arranged for driving the dredging gear, and change gear is provided so that a constant speed of engine can be maintained whether the dredger is working on soft or hard material. Independent manœuvring winches are provided at bow and stern for regulating the cut of the dredger, and independent hoist gear is fitted for controlling the bucket ladder.

Mountpark.—On May 4th, Messrs. Dunlop, Bremner & Co., Port Glasgow, launched the steamer *Mountpark*, which they have built for the Denholm Line Steamers, Ltd., Greenock. The vessel, which is of the raised quarter-deck type, is 250 ft. in length, 37 ft. in breadth, and 17 ft. 6 in. in depth, and has a deadweight carrying capacity of about 2,500 tons. The steamer is constructed to Lloyd's 100 A1 class, and is fitted with the latest appliances for handling cargo. During construction the vessel was superintended by Mr. Alexander Morrison, Greenock, the owners' superintendent. The *Mountpark* is to take the place of the vessel of the same name which was lost in the English Channel in February of last year. The machinery, which will be supplied by the builders, consists of triple-expansion engines, designed to give a speed of 9½ knots. The boilers will be supplied by Messrs. Scotts' Shipbuilding & Engineering Company, Greenock. A Cochran (Annan) Donkey Boiler with patent seamless furnace has been supplied and fitted.

Bankura.—Messrs. Barclay, Curle & Co., Whiteinch, recently launched the single-screw steamer *Bankura*, which they have built for the British India Steam Navigation Company. The vessel is the third of four steamers which Messrs. Barclay, Curle & Co., are constructing for the owners. Like the *Barala*, which was launched from the same yard in February, the new liner is 330 ft. in length, 40 ft. in breadth, 25 ft. 6 in. in depth, and of 3,300 tons. The *Bankura* will carry a limited number of first and second-class passengers, as well as a large number of natives, for whom special accommodation will be provided.

St. George.—The Ailsa Shipbuilding Company, Troon, have launched the triple screw tunnel motor vessel *St. George*, which they have built to the order of the Foreign Office for the use on the river Congo of the British Consul. The vessel, which has a length of 110 ft. on the water line and a breadth of 20 ft. has a draught in loaded condition of 3 ft. She is handsomely fitted up for the accommodation of the Consul and his staff, the upper works and deckhouse being bullet-proof. Electric light and fans have been fitted throughout, and a system of ventilation suitable for a tropical climate has been adopted. A water spray has been provided for cooling the sun deck. The propelling machinery consists

of three sets of Kromhout paraffin motors, driving screws in three separate tunnels, and designed to give a speed of [illegible] knots when the vessel is loaded. All the auxiliary engines are oil driven, and are paraffin.

Samarinda. Messrs. William Hamilton & Co., Port Glasgow, have lately launched a steamer of the following dimensions:—Length, 445 ft. 6 in.; breadth, 55 ft. 3 in.; and depth to shelter-deck, 37 ft. 3 in. The vessel has been built to the order of the Stoomvaart Maatschappij Rotterdamsche Lloyd, of Rotterdam, for their Eastern passenger and pilgrim trade. Special attention has been given to the arrangements for rapid and easy handling of general cargo, the vessel being fitted with large masts and a number of derrick posts, fourteen large steam winches and two steam capstans. The steamer will be supplied with machinery by Messrs. David Rowan & Co., Glasgow. The machinery will consist of triple-expansion engines, having cylinders 29 in., 48 in., and 82 in. in diameter respectively, with a 54-in. stroke, two double-ended marine boilers 13 ft. in diameter by 21 ft. in length, and two single-ended boilers 13 ft. in diameter by 11 ft. [illegible] in length, with a working pressure of 200 lbs. The vessel was superintended during construction by Captain Guthrie, while the machinery department was under the supervision of Mr. Petrie, engineer for the owners. The *Samarinda* is the fourth vessel constructed by Messrs. Hamilton for the same owners. She is longer by 10 ft. 6 in. than the *Jacatra*, which was launched on April 9th.

Indrani.—There has been launched at Scotstoun a new vessel for the Indra Line, Liverpool. The vessel, which is named *Indrani*, is of [illegible] tons deadweight, and has been built to Lloyd's highest class. She has a cellular double bottom fore and aft, and is fully equipped with the most modern improvements, including patent fire-extinguishing apparatus. The *Indrani* is a sister ship to the *Indraghari*, the last steamer launched by the London and Glasgow Shipbuilding Company before their yard was taken over by Messrs. Harland & Wolff, Ltd. Messrs. Matthew Keenan and Co., Ltd. have secured the contract for all the boiler and pipe coverings.

Queen Empress. Messrs. Murdoch & Murray, Port Glasgow, have recently launched a paddle-steamer which they have built to the order of Mr. John Williamson for his Glasgow, Rothesay and Kyles of Bute passenger trade. The vessel, which was named *Queen Empress*, will be shortly ready for service. Her principal dimensions are:—Length, 250 ft.; breadth, 25 ft. 6 in. and depth (moulded), 8 ft. 9 in. The promenade deck is carried forward the entire length of the vessel, the navigating bridge is situated in front of the funnel and steam steering gear is installed. Compound diagonal surface-condensing engines and navy boilers will be supplied by Messrs. Rankin & Blackmore, Greenock. The machinery is designed to give a speed of 17 knots.

Innisagra. The first vessel of the fleet of oil-engined coasters which are being built for the Coasting Motor Shipping Company, of Glasgow, has been launched at Kirkintilloch by Messrs. Peter M'Gregor & Sons. The fleet of boats when complete will consist of eighteen. The orders for sixteen of these were placed some time ago—Messrs. M'Gregor having contracted to build eight, and other two are in contemplation, though not yet on order. The vessels, which will have oil engines of various types, are intended for the general cargo trade. The vessel launched is named the *Innisagra*, and is 127 ft. in length, 18 ft. 3 in. in breadth, and 9 ft. in depth, and has a cargo-carrying capacity of 140 tons. She is similar in size to the other Kirkintilloch vessels, but is smaller than the boats which are being built elsewhere. The engine of the *Innisagra* will be of the Bolinder type, and will be supplied by Messrs. Douglas Primrose & Co., Glasgow. The engine is designed to give a speed of 8 knots, and Scottish crude oil will serve as fuel.

Steel Screw Steamer.—Messrs. Russell & Co., Port Glasgow, launched recently a large steel screw steamer, [illegible] feet in length, 32 feet 2 inches in breadth, and 21 feet 2 inches in depth (moulded). The vessel, which has been built for Messrs. MacVicar, Marshall & Co., Liverpool, is constructed to the highest class at Lloyd's, with scantlings in excess of their requirements, and with poop, bridge and forecastle. She is designed for a speed of 11 to 12 knots, and is fitted with all the latest requirements for a first-class cargo steamer. The engines, by Messrs. David Rowan & Co., Glasgow, are triple-expansion, with cylinders [illegible] in., [illegible] in. and [illegible] in. diameter respectively and a stroke of [illegible] in. There are two double-ended boilers, each [illegible] ft. in diameter, designed for a pressure of [illegible] lbs., and large heating surface. The vessel has been built under the supervision of Captain J. F. Gardiner, the Company's marine superintendent, and the machinery was built at Messrs. G. S. Cowlishaw & Co., Liverpool.

Isherwood Steamer. [illegible] been built for English owners. The vessel, which is constructed to the Lloyd's rules, is of the cargo deck type, with complete shelter deck, and a lower deck fitted in the forward hold. The dimensions are: Length between perpendiculars, [illegible] ft., breadth, [illegible] ft., depth moulded to shelter deck, [illegible] ft. [illegible] in. The vessel will carry a large cargo on a light draught. The machinery is designed to give a speed of [illegible] knots. Both vessel and machinery have been built under Lloyd's special survey for their highest class.

LAUNCHES—Irish.

Laomedon.—On April 24th, Messrs. Workman, Clark and Co., Ltd., Belfast, launched from their North Yard the new steamer *Laomedon*, built to order for the Ellerman Mutual Steam Navigation Co., Ltd., Liverpool (Messrs. Alfred Holt and Co.). The new vessel is [illegible] ft. in length, with a gross tonnage of about [illegible], and has been constructed on a longitudinal girder system, which ensures unobstructed cargo space in the holds. There are four cargo holds and two smaller compartments which are arranged for use either as cargo holds or water ballast tanks. Accommodation is provided for a number of saloon passengers, while the forecastle is arranged for steerage passengers, and for twenty-[illegible] native emigrants. The propelling machinery consists of a set of triple expansion engines with the necessary auxiliaries, steam being supplied by two double-ended boilers working under forced draught, with an auxiliary single-ended boiler for the deck machinery.

Vestris. On May 10th, the new twin screw steamer *Vestris* was successfully launched by Messrs. Workman, Clark & Co., Ltd., from their North Yard, Belfast. The *Vestris* has been built by this firm for the British and South American service of the Liverpool, Brazil and River Plate Steam Navigation Co., Ltd. (Messrs. Lamport & Holt, Ltd., Liverpool, managers), and is similar in design and equipment to the sister vessels *Lautaro* and *Tagus*, which are now in active service, a few modifications in detail having been introduced. The vessel is [illegible] ft. in length, with a gross tonnage of over [illegible] tons, and has been built on the Isherwood longitudinal system of construction, and complies with the requirements of the highest class in Lloyd's Register of Shipping, besides satisfying the Board of Trade requirements for a passenger certificate. The first-class passenger accommodation is situated amidships. The state rooms are large and [illegible] of them arranged on the tandem system, which [illegible] may be engaged as family suites if desired. A number of special cabins are also provided with private lavatories. The public rooms include a [illegible] along the full width of the vessel, with small tables arranged on the restaurant idea; the music room, decorated and furnished in a highly artistic manner; the lounge, adjoining the music-room, richly and beautifully decorated and furnished, and the smoke-room, a handsome and comfortable [illegible], with an veranda cafe at the [illegible]. There is [illegible] specially furnished and decorated for the use of children. The accommodation for second-class passengers includes large and well-appointed [illegible], and handsomely furnished dining, music and smoke rooms. Other interesting features are the gymnasium, barber's shop, the laundry, with electrically driven machinery. The vessel is also arranged for carrying emigrants. The cargo [illegible] into five spacious holds [illegible] of the cargo compartments are [illegible] for the carriage of chilled meat, fruit and produce, with an efficient installation of [illegible]. The vessel is fitted with twin screws driven by two sets of quadruple expansion engines, carefully designed and balanced so as to reduce vibration to a minimum.

Darro. On May 10th, the fourth of the new twin screw steamers the *Darro* was launched for the intermediate passenger service of the Royal Mail Steam Packet Company

to Brazil, Uruguay and Argentina, was launched by Messrs. Harland & Wolff, Ltd., Belfast. Her dimensions are as follows: Length, 517 ft. 3 in.; breadth, 62 ft. 3 in., gross tonnage about 11,900. The *Darro* is being constructed for Messrs. Elder Dempster & Co., Ltd., but will be chartered by the Royal Mail Steam Packet Company. She is an exact facsimile of the R.M.S.P. Co.'s new steamers *Deseado*, *Demerara* and *Desna*. The first-class dining saloon and smoking-room are on the awning and bridge decks respectively, and the first-class lounge is at the forward end of the bridge deck. Every first-class cabin has an electric fan—a provision which will be very popular with the passengers. The second-class dining saloon is on the awning deck aft, and the smoking-room on the poop deck. The second-class state-rooms are arranged in the poop and are comfortably fitted; each cabin is provided with an electric fan. The third-class general room and the smoke-room are in the steel house on awning deck aft, while the third-class saloon is situated on the main deck amidships, and will seat a large number of passengers. The third-class shelter is under the forecastle. The *Darro* will carry a large quantity of cargo, having holds insulated for the conveyance of chilled or frozen meat. There are also compartments insulated for dairy produce and fruit. The appliances for working ship and cargo are of the most modern type. The vessel will have a complete installation of electric light and submarine signalling apparatus. The engines are arranged on the "balanced" principle which has been so successful in eliminating vibration; and with the large airy cabins, electric fans and good promenades, these vessels will be exceedingly comfortable for passengers.

TRIAL TRIPS.

Clio.—On April 15th, the petroleum steamer *Clio*, built at Walker-on-Tyne, to the order of Messrs. H. E. Moss and Co., of Liverpool, and transferred by them to the Deutsch-Americanische Petroleum Gesellschaft, was taken to sea for her trial. The trial was of a six hours' duration and was entirely satisfactory, a speed of 11½ knots being obtained. The chief dimensions of the vessel are:—Length overall, 408 ft; breadth, extreme, 51 ft. 9 in.; depth moulded, 30 ft. 9 in. The total deadweight is about 7,500 tons on a moderate draught of water. The propelling machinery is manufactured by the North-Eastern Marine Engineering Co., Ltd., of Wallsend-on-Tyne, and is of the quadruple-expansion type, having cylinders 23 in., 32½ in., 47 in. and 68 in. by 42 in. stroke, supplied with steam by three single-ended boilers.

Steamer.—On April 16th, a new steamer for the Fishguard and Waterford service of the Great Western Railway Company completed a very satisfactory trial trip off the Tyne. The vessel, which has been built and engined at the Neptune works of Messrs. Swan, Hunter & Wigham Richardson, Ltd., is built of steel and is primarily intended for service as a cattle and cargo boat, but a certain amount of passenger accommodation is fitted to meet the requirements of her intended trade. She has been built to Lloyd's requirements, and is fitted with twin-screw quadruple-expansion engines, balanced on the Yarrow, Schlick and Tweedy system, supplied with steam by four multitubular boilers. On the trial trip a mean speed of 17¾ knots was attained, and the excellence of this type of machinery in preventing vibration was very noticeable. The first-class passenger accommodation, placed on the bridge deck, consists of dining saloon, smoke-room and state-rooms. There is sleeping accommodation for twenty-eight passengers. The whole of the main and lower decks will be utilized for carrying horses and cattle, there being accommodation for twenty horses and 500 head of cattle. In addition to the vessel's use as a cross-Channel steamer, she will also serve as a tender to liners calling at Fishguard, and for this purpose the bridge deck is exceptionally clear, affording good space for passengers and baggage.

Blaxland.—On April 16th, the twin-screw coasting steamer *Blaxland*, built by Messrs. Mackie & Thomson, Ltd., Govan, and engined by Mr. James Ritchie, Glenavon Works, Partick, for Australasian owners, ran trials on the Firth. The machinery worked splendidly throughout. The vessel, which has been delayed waiting for cargo owing to the recent coal strike, has now sailed on its long voyage to Sydney. For Launch, see April issue.

Princess Victoria.—On April 16th, the turbine steamer *Princess Victoria*, built at Dumbarton for the Larne and Stranraer Joint Railways, ran speed trials on the Firth of Clyde. The vessel is a sister ship to the *Princess Maud*, which was built for the same owners in 1904. When she is placed in commission the railway company will be able to maintain their cross-Channel service by means of turbine steamers alone. For Launch, see April issue.

Dinorah.—On April 17th, the single-deck steamer *Dinorah*, built and engined by Messrs. William Doxford & Sons, Ltd., Sunderland, to the order of Messrs. M. U. Martinolich & Co., Lussinpiccolo, ran a successful sea trial, when a mean speed of 12¼ knots was attained. For Launch, see May issue.

Kangean.—On April 20th, the finely-modelled steamer *Kangean*, built by the Northumberland Shipbuilding Co., Ltd., of Howdon-on-Tyne, to the order of the Stoomvaart Maatschappij Nederland of Amsterdam, for their Eastern cargo trade, also for the conveyance of pilgrims from Java to Mecca, left the Tyne to undergo her official trial trip. The vessel is the largest yet built at Howdon, and with her elaborate deck arrangements and life-saving appliances was an imposing spectacle on her maiden run. She has been specially designed for this trade and built to the highest class in Lloyd's Register. She is built on the deep frame system, rigged with two twin masts, and is fitted with all the latest improvements and up-to-date appliances to make her in every way a first-class liner. She is over 445 ft. in length by 55 ft. 3 in. by 37 ft. 3 in., with three complete steel decks, including shelter deck all fore and aft, and a boat deck amidships. The vessel has a cargo capacity of over 8,700 tons on a light draught. A large quantity of water ballast is carried in the cellular double bottom for peak, and large deep-water ballast tank which, with the bunkers, will put the vessel in excellent trim irrespective of cargo. The shelter 'tween deck is of exceptional height, and is arranged so that a large number of pilgrims can be carried. Loading and discharging facilities are considerably in excess of the usual. The steamer has ten derrick posts and twenty-two large steel tubular derricks, and one 25-ton derrick, all made of Mannesmann steel tubes, and twenty-two powerful steam winches by Messrs. Clarke, Chapman & Co., Gateshead-on-Tyne, to ensure the most expeditious handling of cargo. Powerful combined steam and hand-steering gear on the Wilson-Pirrie principle by Messrs. John Hastie & Co., is fitted in steel house on shelter deck aft, and actuated from amidships by telemotor gear of Messrs. MacTaggart, Scott & Co.'s make, and steam windlass of the latest type by Messrs. Clarke, Chapman and Co., Ltd. The vessel has also been fitted with a "Halley" patent combined fire-extinguishing and disinfecting machine, having pipes led to all the different cargo spaces, accommodations and other compartments in the vessel, so that with this effective preventative serious damage by fire to the cargo or vessel may be looked upon as being next to impossible; also electric light has been fitted throughout, and Welin's patent davits to the light lifeboats. An installation of electric light, complete with a turbo dynamo, has been supplied and fitted throughout the vessel by the A.E.G. Electric Co., Ltd., which installation has a total of about 400 lamps, in addition to which mercury arc lamps and cargo clusters have been fitted. De Wit's patent electric axiometer installation has been fitted from the steering gear house aft to the bridge amidships, also a Graham's Naval telephone apparatus from the flying bridge to the poop. The vessel has been fitted with eight lifeboats, each with Mills patent boat disengaging gear, also Welin's patent double banked davits to ensure the expeditious handling of the boats. Triple-expansion machinery of special design and construction has been supplied by Messrs. the North-Eastern Marine Engineering Co., Ltd., of Wallsend, having cylinders 27½ in., 46½ in., 80 in. by 54 in., with two double-ended and two single-ended boilers, with a working pressure of 215 lbs., and has been built to the requirements of Lloyd's and the Netherlands Law, the indicated horse power being about 4,150, and the boilers fitted with Howden's system of forced draught. During construction the vessel has been superintended on behalf of the owners by Mr. M. A. Cornelissen and Mr. J. Slicker, and the machinery by Mr. Visker and Mr. Lindeman. The trial trip was in every way satisfactory and a speed of 13 knots was easily obtained, after which the vessel sailed for Amsterdam under the command of Captain J. Veenhoven.

Vauban.—On April 23rd, the new twin screw steamer *Vauban*, built and engined by Messrs. Workman, Clark and

Co., Ltd., Belfast, left Belfast Harbour and proceeded down the Lough for adjustment of compasses, machinery tests and speed trials, which were successfully carried out, and the vessel afterwards left the Lough for Liverpool to load cargo and embark passengers for her initial voyage to South America. For Launch, see February issue.

Karl Schroers.—On April 24th, the fine steel screw steamer *Karl Schroers*, built by Sir Raylton Dixon & Co., Ltd., at their Cleveland Dockyard, Middlesbrough, to the order of Mr. Karl Schroers, of Rotterdam, etc., proceeded to sea for her official trials. The trials passed off most successfully and the vessel proceeded to Rotterdam under the command of Captain Leeuw. The hull and engines have been constructed under the supervision of Captain Leeuw and Mr. P. van Wiermgen. For Launch, see April issue.

Makarini. On April 25th, the new twin-screw steamer *Makarini* left Belfast Harbour and proceeded down the Lough for adjustment of compasses, machinery trials and speed tests. These proved highly successful, and the vessel afterwards left for London, where cargo will be loaded for the initial voyage to Australia. The *Makarini* has been built and engined by Messrs. Workman, Clark & Co., Ltd., Belfast, for Messrs. the Tyser Line, Ltd., London, and is a vessel of the shelter deck type, 486 ft. in length with a gross tonnage of over 10,000, and has been constructed under special survey for the highest class in Lloyd's Register. For Launch, see March issue.

Marguerite. On April 30th, there was taken to sea the finely-modelled steamer *Marguerite*, of Bayonne, built by Messrs. Wm. Gray & Co., Ltd., of West Hartlepool, to the order of Messrs. Lysberg & Co., of Cambrian Buildings, Cardiff and Paris. The steamer was half loaded at Sunderland with 2,800 tons of coal, and ran on the measured mile for four hours, giving an average speed of 11½ knots, the machinery running beautifully against strong wind and a rough sea. After the trial trip the steamer proceeded on her voyage to Bordeaux to discharge her cargo. For Launch, see April issue.

Eskbridge.—On April 30th, the s.s. *Eskbridge*, built by Messrs. Wm. Pickersgill & Sons, Ltd., went on her trial trip. Her dimensions are :—Length, 342 ft.; breadth, 48 ft., and depth, 25 ft. 8 in. She has been built under special survey to take Lloyd's highest class as a single-deck steamer. The vessel is built on the Isherwood system, and is fitted with cellular double bottom throughout for water ballast, in addition to which the after and fore peaks are fitted as ballast tanks. She is provided with five large cargo hatches, each of which is fitted with double derricks, with tables and outriggers capable of raising heavy weights, large derrick posts being fitted where necessary. The vessel is rigged as a fore and aft schooner, with steel lower masts and wood topmasts, eight steam winches have been supplied by Messrs. J. Lynn and Co., and a special quick warping windlass by Messrs. Emmerson, Walker & Thompson Bros. The steam-steering gear is by Messrs. Donkin & Co., and is fitted in house amidships abaft the engine-room, and is controlled by means of rods and bevelled wheels from wheelhouse on bridge. The donkey boiler for supplying steam to deck range is by Messrs. the Blake Boiler, Wagon and Engineering Co. The captain and officers are berthed in the poop, together with a large mess-room tastefully fitted out in oak, and houses are fitted out on the bridge for the accommodation of the engineers. The crew and petty officers are berthed in the forecastle. The machinery and boilers are supplied by Messrs. Richardsons, Westgarth & Co., Ltd., Sunderland, the engines having cylinders 24 in., 39 in., 65 in. by 45 in. stroke, and the two specially large boilers are of steel with a working pressure of 180 lbs. The steamer has been built to the order of Messrs. Crosby, Magee & Co., West Hartlepool, and during construction was under the supervision of Messrs. T. C. Nevison and Son, West Hartlepool. The trial was most successful in every way, a speed of 10½ knots being obtained, and the owners and superintendents expressed their complete satisfaction. The vessel afterwards left for Baltimore under the command of Captain T. Webster.

Progress III.—On May 7th, the s.s. *Progress III.*, built by the Campbeltown Shipbuilding Co., Campbeltown, for Messrs. Hans Kiaer & Co., Drammen, ran trials at Wemyss Bay. The vessel is about 6,500 tons deadweight, and is of the single-deck type with poop, bridge and topgallant forecastle. Triple-expansion machinery, taking steam from three large main boilers, working under natural draught, has been supplied by Messrs. John G. Kincaid & Co., Ltd., Greenock.

Ockley. On May 2nd, the steel screw steamer *Ockley*, built by the Northumberland Shipbuilding Co., Ltd., Howdon-on-Tyne, to the order of Messrs. Houlder, Middleton & Co., Ltd., London, left the Tyne for her official trial trip. The trial trip was in every way satisfactory, a speed of 11¼ knots being maintained. The vessel is 390 ft. long by 49 ft. beam by 29 ft. 4 in. deep, and has been built under special survey to the highest class at Lloyd's. She is fitted with long bridge, long poop, topgallant forecastle, the accommodation which is very ample, being placed in steel houses on bridge deck. Special attention has been paid to the loading and discharging gear and a complete outfit for the rapid handling of cargoes arranged for, consisting of ten steam winches by Messrs. Clarke, Chapman & Co., Ltd., Gateshead-on-Tyne, a large number of cargo derricks and steam windlass by Messrs. Clarke, Chapman & Co., Ltd. She is fitted with the usual water ballast arrangements for light passages. The machinery has been supplied by Messrs. Richardsons, Westgarth & Co., Ltd., Sunderland, consisting of engines with cylinders 25 in., 41 in., 69 in. by 48 in. stroke, three boilers with 180 lbs. pressure. The vessel will carry about 7,700 tons on a light draught and will steam about ten knots loaded at sea.

Letitia.—The new twin-screw steamer *Letitia*, which Messrs. Scott's Shipbuilding and Engineering Co., Greenock, have built for the Canadian service of Messrs. Donaldson Brothers, recently ran trials on the Firth of Clyde. For Launch, see April issue.

Katoa.—On May 13th, Messrs. Osbourne, Graham & Co. sent to sea for her official trial the steel screw steamer *Katoa*, which they have specially constructed to the order of Messrs. The Union Steamship Co., of New Zealand, Ltd. The vessel has been built to take highest class at British Corporation and is the fifth steamer constructed by this firm and owned by the Union Company. The vessel was in a half-loaded condition and the trial, which was of twelve hours' duration, resulted in the vessel obtaining a mean speed of 12 knots. This was very satisfactory to all concrened. After the trial the vessel proceeded to Middlesbrough to complete the loading of her first cargo prior to her leaving for New Zealand. For Launch, see May issue.

Normanton.—On May 14th, the fine steel screw steamer *Normanton*, built by Sir Raylton Dixon & Co., Ltd., at their Cleveland Dockyard, Middlesbrough, to the order of Messrs. the Denaby and Cadeby Main Collieries, Ltd., of London, etc., proceeded to sea for her official trials. The trials passed off most successfully and the vessel proceeded to Hull under the command of Captain W. Newlove *en route* for Cardiff, where she will load for the River Plate. For Launch, see May issue.

El Uruguayo.—The twin-screw steamer *El Uruguayo*, built by Messrs. Alex. Stephens & Sons, Ltd., of Linthouse, to the order of Messrs. Furness, Withy & Co., Ltd., for the British and Argentine Steam Navigation Co., Ltd., underwent her trials on the Clyde recently. The vessel maintained a speed of 13 knots, the main engines and the auxiliary machinery working throughout in the most satisfactory manner. For Launch, see January issue.

WEBSTERS LTD. For the production of a paint to stand the test of sixty years they must necessarily be of a high-class nature. Such is the record of Webster's Ltd. of Bunhill Wharf, Hull, whose class over the period named have had their compositions for ships' bottoms on the market. The reputation established so many years ago has not only been maintained, but it has been [illegible] by the [illegible] of the Company with their great practical knowledge of what is required to meet great[illegible] various trading [illegible] and also the production of [illegible] to compete favourably with other well known brands. The [illegible] have agents and stocks at a number of ports and they are now rapidly extending their [illegible] to those ports where there is at present no representative of their goods. Besides the above [illegible] well known galvanizing paints for davits [illegible] and [illegible] and [illegible] and [illegible] Webster's Ltd. [illegible] at G. D. Webster & Son, Ltd., [illegible]

SUBMERSIBLE MOTORS.

IN our issue of November, 1911, we gave a description of a submersible motor, which is being placed on the market by The Submersible and J. L. Motors, Ltd., of Southall, Middlesex. On the 20th April a demonstration was given on the Thames at Hammersmith. The demonstration consisted in pumping out a flooded barge and raising it with a small Macdonald submersible motor pump. The barge, about a 100-ton craft, was entirely submerged and when the tide fell so that the gunwales began to show above water the pump was put into operation and in about thirty minutes the barge was practically empty. The pump employed was a 5-in. centrifugal Gwynne pump running at 950 r.p.m. off a 220-volt circuit and delivering 600 gallons per minute. It was worked by a submerged 10 h.p. electric motor taking its power direct from Messrs. Gwynne's works.

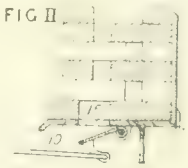
MESSRS. SUTER HARTMANN & RAHTJENS COMPOSITION CO. LTD., have supplied their composition to vessels representing 3,383,788 tons during the last three months.

THE annual report of the Japanese Mercantile Marine Bureau for the year 1910-1911 has just been issued.

The Marine Engineer and Naval Architect Patent Record.

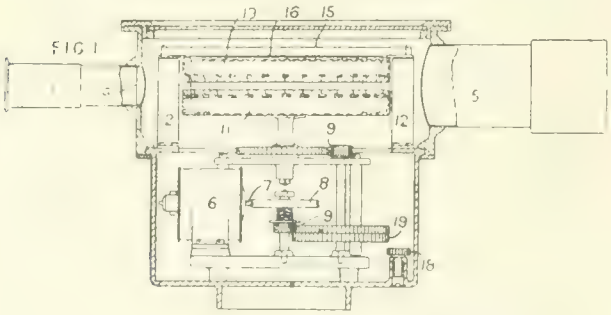
Compiled by Messrs. E. P. Alexander & Son, Chartered Patent Agents, 306, High Holborn, London, W.C.

461. Fire-Bridges for marine boilers are formed of bricks laid in open formation on a dead plate 10, having a damper controlled opening 15 to the ashpit. The top and bottom



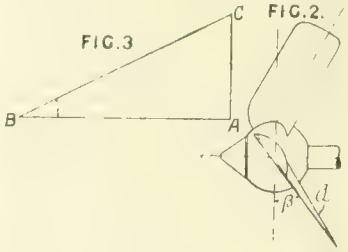
courses are formed of front and back rows of bricks laid closely together.

1,024. Nautical instruments.—An instrument for use on board ship, for determining the inclinations to the ship's course and to the meridian of the line joining the ship to a distant object, consists of two cylindrical scales 11, 13, the former set electrically from a gyro-compass, and the latter



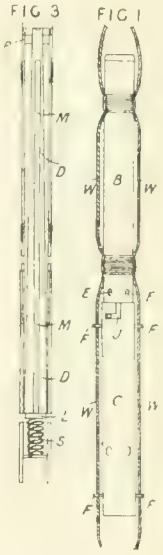
fixed to the ship; both these scales are visible through the eyepiece 3 of a telescope 5, which can turn about the axis of the two scales without moving either. The scale 11 is connected through gearing 9, 8, 7 to a motor 6 actuated by a gyro-compass, and is graduated from 0 to 360 degrees. The scale 13 is attached to the fixed pillars 12, and is graduated to 180 degrees each side of zero. At the commencement, the telescope is pointed fore and aft, whereupon the zero of the scale 13 should coincide with the line 4 in the field of view; the division on the scale 11 coinciding with this line should be equal to the angle between the ship's course and the meridian. The scale 11 can be set to the required position by raising the pinion 18 into engagement with the wheel 19 and rotating the pinion. Attached to the scale 11 there may be a compass card 16, over which is stretched a fore-and-aft line 15, so that the inclination of the course to the meridian can be obtained without using the telescope. In a modification, the scales are horizontal and are projected into the field of view by right-angled prisms. The scales may be illuminated if required.

1,150. Screw Propellers.—In a propeller of the type described in Specification 17,422/07, the angle β, Fig. 2, between the plane of the blades d and the normal to the shaft axis is determined as follows. The most suitable diameter



and pitch are determined for a given vessel by any usual method. As shown in Fig. 3, A B is made equal to twice the diameter, and A C is drawn at right-angles and made equal to the pitch. On joining B C, the angle A B C gives the value of β, Fig. 2.

1,572. Sea-sounding appliances.—Instruments of the "atmospheric" type, such as the one described in Specification 23,875/07, have the outer tube made in two parts B, C, joined by a bayonet-joint J. At the top of the part B is a plug P, having a central hole through which the open upper end of the inner tube M passes, and smaller holes or grooves for the passage to the inner tube of water that has entered the instru-



ment through the holes E. At the bottom of the part C and pressed against the closed end of the tube M by the spring S is a plate L, so that when the parts B, C are joined, the tube M is pressed up through the plug P and held. An interior scale D is also provided. The line W passes through eyes F so as to permit the part C to be lowered.

The Marine Engineer

And Naval Architect.

LONDON, JULY, 1912.

THE SENATE REPORT ON THE "TITANIC" DISASTER

SINCE our last issue the Senate Committee appointed to carry out the enquiry into the *Titanic* disaster has presented its report to Congress and the many who, judging by the conduct of the proceedings, anticipated a drastic announcement, will not be disappointed in the result. The report was presented by the chairman, Senator Smith, in a florid speech of his characteristic type, but those who take the trouble to read the matter carefully must recognise that the remainder of the committee have evidently used their influence in the direction of treatment of the subject in a manner which is in marked contrast with the expressions and conduct of the chairman. The main findings may be summarised as follows: That the warnings as to ice were ignored by the *Titanic;* that as the transverse bulkheads terminated in a deck which was not water-tight, the integrity of the water-tight compartment was not assured; that the passengers had no general warning of the danger; that the *Californian* saw the distress signals, but did not respond to them; that hundreds of lives were sacrificed owing to lack of preparation in dealing with the boats and in properly filling them with people; that if there had been much sea running it is doubtful whether the boats could have been lowered into the water without injury or destruction; that if proper discipline had been exercised and concentration of survivors in some of the boats been effected, the remainder could have picked up survivors after the ship had foundered, and lastly that the wireless operator of the *Carpathia* failed to show proper vigilance in handling the important work confided to his care. In the face of these findings it is not surprising that certain definite recommendations are made, in fact one could not expect otherwise from a body of men who appreciate the responsibility of their task. The recommendations comprise boat accommodation for every person, at least four sailors to be assigned to each boat, boat drill by crew at least once a month, which shall include [illegible] as well as lowering, passengers to be apportioned to boats before sailing, all ships carrying more than 100 passengers to be compelled to carry two searchlights, and in the matter of wireless telegraphy that it is essential that there should always be somebody on duty at the apparatus, which should be provided with auxiliary power independent of the main engines, and in addition, legislation should be enacted to prevent amateur wireless operators working and to ensure the secrecy of messages. The Committee has gone a considerable length in its view as to the absolute necessity for certain structural requirements, which matter seems to us to be the most important as affecting shipowners and shipbuilders in the future. The Committee lay it down that all steel ocean, coastwise or sea-going ships carrying 100 or more passengers should have a water-tight skin inboard of the outside plating, extending not less than 10 per cent. of the load draught above the full load water line, either in the form of an inner bottom or of longitudinal water-tight bulkheads, and this provision should extend from the forward collision bulkhead over not less than two-thirds of the length of the ship. All steel ocean, coastwise or sea-going ships carrying 100 or more passengers should have bulkheads so spaced that any two adjacent compartments of the ship may be flooded without destroying the floatability or stability of the ship. Water-tight transverse bulkheads should extend from side to side of the ship, attaching to the outside shell. Transverse bulkheads forward and abaft the machinery spaces should be continued water-tight vertically to the uppermost continuous constructural deck. The uppermost continuous structural deck should be fitted water-tight. Bulkheads within the limits of the machinery spaces should extend not less than 25 per cent. of the draught of the ship above the load water line and should end at a water-tight deck. All water-tight bulkheads and decks should be proportioned to withstand, without material permanent deflection, water pressure equal to five feet more than the full height of the bulkhead. Bulkheads of novel dimensions or scantlings should be tested by being subjected to actual water pressure. It would seem that from the reception of the report by the Senate a considerable impression has been made and it is not unreasonable to assume that the following measures in progress will receive increased support from the tenour of the report, *viz.*:—The Alexander Radio Telegraphic Bill, which is intended to bring the United States into consonance with the Berlin Convention, the Bill for regulating the provision and operation of wireless apparatus on board ship, requiring American and foreign steamships using American ports and carrying more than fifty persons to be equipped with a wireless installation fitted with auxiliary power and having two operators, and lastly, a Bill making it a misdemeanour for captains not to go to the rescue of ships in distress. The serious aspect of the case is that, however onerous or possibly undesirable any new regulations may be, the burden, apart from coasting trade, will mainly fall on the members of others than Americans, as the ocean carrying trade is carried on by foreign countries, and we find that, [illegible] been, the results of the disaster may have a far reaching effect on the shipping interests of this country. We do not propose to follow Senator Smith through his

flamboyant speech or his personal recommendations, as we are certain that his style is not shared by his colleagues on the committee, and we prefer to await with interest the result of careful and deliberate consideration by a government which in the past has had to face the difficulties of dealing with domestic ship disasters of considerable magnitude with a hope that the sense of proportion will not be lost in the effort to control matters in the future.

SEAFARERS AND THE FRANCHISE.

IN this democratic age the disabilities under which all mariners labour in being to all intents and purposes excluded from exercising their votes at Parliamentary elections, are worthy of the serious consideration of all thoughtful persons, whatever their politics may be, so that in the future this class of citizen shall not figure as a mere negative quantity in Parliamentary affairs. The Imperial Merchant Service Guild has made this subject one of its special features and has been successful in procuring a Parliamentary committee for dealing with subjects of this nature. This committee is of a non-party character and comprises members of both Houses of Parliament and has been active in pressing upon the Prime Minister the necessity for some improvement in the facilities for the voting of sea-faring men. While it will be admitted that it is very objectionable that a large section of the community should be practically disenfranchised owing to the exigencies of their daily avocation, at the same time the novel principle of voting by proxy, if given to one class, may be claimed by another class, and it is difficult to see where the limitation is to be placed. We think, however, everyone will agree that something should be done to enable those afloat to have their share in the choice of the persons to be entrusted with the government of the country to which they belong and which they support.

"TITANIC" ENGINEERING STAFF MEMORIAL.

THIS fund is gradually and steadily growing, while contributions are being received from many parts of this country and abroad.

The amounts received are stated to be as follows:—

Institute of Marine Engineers, London, up to 26th June	£1,195	0	0
Southampton Committee (for the erection of a monument in Southampton), up to 20th June, about	500	0	0
Liverpool Committee (for the erection of a monument in Liverpool), up to June 25th	1,167	14	0
Total ...	£2,862	14	0

It would seem to be a very excellent way of dealing with the aggregate total to have a tablet or suitable memorial placed where engineers do mostly congregate in each of the three centres whence the contributions are being forwarded. The premises of the Institute of Marine Engineers is eminently the most representative in the Kingdom for a memorial, while suitable situations can doubtless be found in Southampton and Liverpool where memorials may be placed, fit for the purpose, without too much ostentation. It is being hoped by an increasing number of engineering friends that the beneficent purpose which has been advocated, an orphanage, should hold premier place in the deliberations of the committees, as undoubtedly the purpose of the memorial would be best served by association with help for the children of marine engineers, who would grow up with the thought imbued in their minds that, as one result of the admiration evoked by the fellow-craftsmen of their fathers, they themselves were aided in the first years of their journey through life.

The Institution of Engineers and Shipbuilders in Scotland is receiving contributions from members to erect a tablet in their building in Glasgow.

"TITANIC" ENGINEERING STAFF—LIVERPOOL MEMORIAL FUND.

THE members of the Liverpool Committee who are working towards a memorial to the *Titanic* engineering staff are desirous of perpetuating the memory of the engineers by means of a monument in Liverpool, for the erection of which a site on the bank of the Mersey is held in view. The list of subscribers to the fund indicates that a good deal of sympathy with this definite object is entertained, and it is desired that the appeal should be placed before our readers and given publicity to, so that those whose instinctive wish is to assist in the erection of a monument at Liverpool, on account of their sympathies being in that direction, may have the opportunity placed before them, as shown in the following letter:—

Engine Room Heroes Memorial, R.M.S. *Titanic*,
10, Drury Lane, Liverpool, June, 1912.

Dear Sir,—Herewith I have pleasure in sending you a prospectus, by which you will observe that a short time ago a committee was formed in Liverpool, with the Right Hon. Earl Derby, Lord Mayor, as president, for the purpose of erecting on the banks of the Mersey a lasting and handsome memorial to the engineers.

The munificent sums of money raised for the philanthropic side of the question, amounting to nearly £400,000, renders it altogether unnecessary to make further provision in that direction.

On behalf of the committee may I therefore appeal to you to favour us with a subscription in order to enable us to erect a memorial worthy of the deed of heroism it commemorates.

Enclosed is a preliminary list of some of the subscriptions received to date, most of which have been voluntarily sent.

Trusting to be favoured with your valued support,

Yours faithfully,
ARTHUR J. MAGINNIS, Chairman.

"TITANIC" ENGINEERING STAFF—SOUTHAMPTON MEMORIAL FUND.

WHILE it has been pointed out by the Liverpool committee that it is important to have a monument on the bank of the Mersey, there is an equally strong desire at Southampton that a memorial should be erected at that port, where the ship and most of the *personnel* were best known. The Institute of Marine Engineers' official letters on the subject show that the intention is to satisfy the natural desire on the part of many engineers and

their friends for a visible memorial, but mainly to aim at a memorial of a beneficent character which will memorize the engineering staff and accomplish a good work in doing so. Our readers can judge for themselves which of the proposals meets their own views and give their donations accordingly.

THE following resolutions have been passed by the National Association of Stationary Engineers of Milwaukee, U.S.A.—Edwin Reynold's Association No. 1. Being in full sympathy with our fellow craftsmen of the marine service who, following the call of duty, perished in the sad disaster which led to the sinking of the steamship *Titanic*, April 14th, 1912, we deem it meet and just that their bravery and sad ending be duly recognised, therefore be it

Resolved, by this Association in regular meeting assembled, that our heartfelt sympathy for the brave boys lost, and for their bereaved relatives, be hereby expressed, and may they find their reward in that great beyond where the One above watches over all and may the comforting Angel of Pity spread her wings over the sorrowful relatives; and be it further

Resolved, that these resolutions be spread upon our minutes, and a copy forwarded to the Supreme Body of Marine Engineers of England, a copy to the Board of Trade, London, England, a copy to the Supreme Body of Marine Engineers of the United States, and a copy to our official paper, the *National Engineer*.—Approved, Ferd. Krieger, President; J. W. Downing, Secretary, No. 1. Milwaukee, Wis., May 4th, 1912.

THE COUNCIL OF THE ASSOCIATION OF ENGINEERS-IN-CHARGE authorised an appeal to the members on behalf of the memorial. This has been issued by Mr. S. M. Singleton, hon. secretary, in the following terms: "It was universally felt at a recent Council meeting that the members of the Association would certainly like to contribute as a body to this very admirable Memorial Fund. It is very gratifying to the Association to know that it numbers among its members many marine engineers of whom they are justly proud, and the Council feel certain you are desirous that your admiration for these brave British confréres should take a practical form. I shall therefore be pleased to receive and acknowledge the receipt of any number of shillings from one upwards, and hand in the name of the Association the total contributed to the authorities having control of this fund. Your prompt reply to the Council's request will be greatly appreciated by me."

"TITANIC" ENGINEERING STAFF MEMORIAL.—Additional ships which have contributed to the Institute of Marine Engineers' Fund since the list published in our June issue are:

Afghanistan.	Highland Pride.	Nephrite.
Beryl.	Highland Warrior.	Otaki.
Cairngorm.	Jaffa.	Plasma.
Camio.	Karonga.	Prase.
Chyebassa.	Katuna.	Pyrope.
Cornelian.	Kioto.	Rangatira.
Culna.	Kyanite.	Remuera.
Demosthenes.	Lady McCallum.	Ruby.
Devon.	Matatua.	Sagenite.
Emerald.	Mimiro.	Sard.
Girasol.	Minnehaha.	Seldanha.
Glenlogan.	Mombassa.	Waimana.
Highland Brae.	Morion.	

THE TITANIC ENQUIRY.

CONTINUING the comments on the evidence adduced at the enquiry, it may be recorded that several days of the sittings were taken up with hearing and recording the details connected with the adventures of No. 1 Emergency boat. The term "Emergency boat" seems to have troubled a good many people. Some people spoke of it as "the Captain's boat," and others distinguished it as "not being a lifeboat," all being apparently oblivious of the fact that the emergency boats on each side of the ship were so called because at sea they were always kept swung out; were not covered up; and seemed every night to have been furnished with lamps, so that if anyone fell overboard they might be got away with the least possible delay. The characteristic which distinguished them from the other fourteen wooden boats was only the fact that to be handier in case of sudden emergency they were considerably smaller, and so could accommodate somewhere about forty persons instead of, as the others, from sixty-five to eighty, according to necessities of the moment. No. 1 got away with ten men and two women, the latter being Lady Duff-Gordon and her secretary, Miss Francatelli, whilst the remainder included Sir Cosmo Duff-Gordon, two other male passengers, and seven members of the crew. An account of the disaster purporting to be written by Lady Duff-Gordon had appeared in the press, and comment had been made on the fact that this boat, though comparatively empty, did not pick anyone out of the water, whilst it further transpired that the lady's husband had given cheques for £5 each to the members of the crew who manned the little vessel. Both the Duff-Gordons went into the box and gave their version of what took place, her ladyship strongly repudiating the authenticity of the story printed over her name. Some days after their evidence had been recorded, the Attorney-General made a statement to the effect that his view was that the conduct of Sir Cosmo and Lady Duff-Gordon, whatever it was, was quite immaterial to the inquiry. Indeed it was made clear by the tribunal that the conduct of passengers as such was not a matter within the scope of the inquiry. Had this proposition been stated earlier the proceedings might have been materially shortened.

What really was much more to the point was the expert evidence as to the precautions actually taken in regard to the safety of the *Titanic* and those aboard of her, and as to the lessons to be learnt from this awful disaster.

First, as regards bulkheading, we had Mr. Edward Wilding, of the firm of Mesrs. Harland & Wolff, strongly supporting the design of the *Titanic*—which relies entirely on double-bottom and transverse bulkheads. Against him was pitted Mr. Pesketh, naval architect to the Cunard Company, a gentleman who naturally pins his faith to the design followed out in the *Lusitania* and *Mauretania*, whereby longitudinal bulkheads and protective side bunkers are introduced in combination with the transverse divisions, arrangements being devised to counteract the possibility of listing, when the skin of the ship is pierced. Mr. Wilding's view was that these arrangements might not be found to be effective, and thus that the remedy might therefore aggravate the trouble.

Then came the question of searchlights and binocular glasses for look-out men. A witness from the Admiralty was quite against the use of searchlights, as were some others, there being a feeling on the part of some witnesses that they might be positively dangerous in practice. The views about the binoculars being not so positive. No one seems to have suggested more than that they might not be an advantage, but no one hinted that they would be capable of doing much harm if provided.

The question of the efficiency of the present regulations as to boat accommodation was gone into most

thoroughly, and opinions the most diverse were expressed. "Boats for all" seem now to be provided or at least under order for all passenger vessels. But owners seem frankly to admit that they are adding to their boats, not necessarily because they think it essential or even admissible to do so, but simply because the public wishes it, and it is the public whose custom they want and whose wishes must therefore be gratified. Against an excessive provision of boats it is argued that there is a danger of making ships too tender if extra weights are placed on the boat decks, whilst it is also pointed out that it is possible to so cumber the space that hindrances may be put in the way of launching any of them in time of emergency. Some interesting evidence was given as to the object with which boats were thought to be carried in ships which were believed to be unsinkable. They might be called upon, it was said, to rescue passengers and crews of other ships in distress, or to land the passengers of their own vessel in case of stranding. This latter duty could, of course, be performed by taking the passengers off in successive boat trips. But even the provision of boats for all does not seem to insure that in time of emergency boats for all will be available. The accident which renders recourse to them necessary may destroy part of the ship's equipment of boats, or she may so list that some of them may not be capable of being launched. Is provision of boats in excess of "boats for all" to be made in view of the possibility of these eventualities, and if so, to what extent? These are amongst the delicate and difficult problems which have been raised at the inquiry, and it will be interesting to see how the Court will answer them. Other points upon which there will be some difficulty will be those of the ship's speed, and of the look-out under the conditions in which she was placed. A good deal will no doubt be said as to the arrangements for wireless messages in regard to ice warnings and to calls of aid for vessels in immediate need of assistance.

A point of great interest to marine engineers was raised by Mr. Roche in his examination of Mr. Bruce Ismay, it being suggested that in future steps should be taken in time of danger to call the engineers from below so that they might have an opportunity of taking their places in the boats. On this point Mr. Harold Sanderson, of the firm of Messrs. Ismay, Imrie & Co., made one notable statement to the effect "that the engineers of the *Titanic* were fully alive to their danger after the collision, and if they did not come on deck it was due to *a magnificent conception of their duty*." A magnificent conception of their duty carried into effect and sealed by the death at his post of every member of the engineering staff. "*C'est magnifique, mais il n'est pas la guerre*," was the observation of the French strategist on the charge of the Light Brigade. Magnificent, undoubtedly, was the heroism of these engineers.

A good deal of evidence from official sources was adduced. Sir Walter Howell, of the Marine Department of the Board of Trade, admitted that there had been no alteration in the maximum requirement of boats for big passenger liners in eighteen years, although in that time the greatest Atlantic steamer had sprung from the *Lucania* of 13,000 tons to the *Titanic* of 46,000 tons. But he contended that the increase of tonnage and the accompanying increase of passengers were counterbalanced by the greater safety of the ship herself.

Sir Alfred Chalmers followed with a similar explanation as to why no alteration had been made. He considered the disaster such an extraordinary one that no lessons for ordinary conditions are to be learned from it. Captain Young, who succeeded Captain Chalmers as nautical adviser to the Board, held that a steamer should carry sufficient boats to provide for the proper and safe transfer of passengers from the vessel to another, and not necessarily "boats for all."

A large number of masters of passenger and mail steamships engaged in the Atlantic passenger trade were called to show that the custom of all liners is to persevere with their full speed, even in the ice region, until ice is actually sighted. One master, Captain Passow, of the American Line, who has made some 700 passages, said until this enquiry came on he had never heard of a black iceberg. But another gave what is probably the explanation of the phenomenon. He had been close to an iceberg when it capsized. The part which went below was of the usual light colour. But that which had been under water now appeared, and this was of a dark blue. Most of these authorities claimed that icebergs of any height could be sighted at a distance of miles—two or three, say—even at night. But this it must be taken to be under ordinary circumstances. In the *Titanic* case it would appear that there was a conjunction of a dark berg and the still night, both of air and water, which tended to prevent any of the usual indications coming to either the eye or the ear of the look-out. Sir Ernest Shackleton explained to the Court that he slowed even his little six-knot *Nimrod* when expecting ice, and laid it down that the best position for the look-out in the ice-region is as near as possible to the water-line. His view is evidently taken by the Canadian Pacific Line's authorities, for they post, when in the proximity of ice, a man on the forecastle head, as well as the usual look-out in the crow's nest. Then Signor Marconi gave his evidence, of which, perhaps, the most interesting part was that in which he explained that he is perfecting a device by which a rest can be given to the wireless operator with the assurance that no message will be lost by his absence. To effect this object a bell, actuated by the Hertzian waves which convey the wireless messages, will be fixed, say, in the wheel-house, which is, of course, always occupied at sea. This will apprise the man at the wheel or the officer of the watch of the fact that the Marconi man is wanted, and thus he will be able to be called to take the message which is coming to the ship.

Lord Mersey, when the evidence closed, was clearly of opinion that one point could be determined at once. It was that the use of binoculars by look-out men is not essential or, apparently, even desirable. He felt, too, that it was important that the sittings should not be prolonged more than was necessary, and, accordingly, he ruled out all discussion as to improvements in bulkheads and the institution of water-tight decks in merchant steamers, holding that these matters would be more fittingly dealt with by the bulkheads committee, which is about to sit.

In our next issue we shall hope to deal with Lord Mersey's report.

LETTERS TO THE EDITOR.

TITANIC ENGINEERS' MEMORIAL.

To the Editor of THE MARINE ENGINEER & NAVAL ARCHITECT.

Dear Sir,—As a subscriber to the Fund and as one who [illegible] I feel for your consideration of the following point, which, and at the proposal in your leading article in the "Marine Engineer and Naval Architect" for June? No doubt all will agree with me that there could be no better use for the Fund than to provide for the orphans of the engineers of the ill-fated vessel, and also if possible for the orphans of other British marine engineers. I suggest that the best method of carrying out the object would be to give the financial help in such a form as to maintain the home in which those where the mother is still able and willing to look after her young children. There may be cases where mental [illegible] orphanage [illegible] but in [illegible] to a [illegible] country. The title "Marine Engineers' Orphan Homes" would be appropriate. Just instead of one large Orphanage there would be many "Orphan Homes" as there are Sailors' Homes, maintaining monthly allowances. The [illegible] society known as the Post Office Orphan Homes work on the same principle, the society prefer to maintain the home for the widow and her young children rather than establish and keep up an orphanage. Even where there are large orphanages [illegible] it is [illegible] that they are not suitable places for young children; [illegible] the Royal Marine Institution for Boys at Deptford [illegible] that children under ten should be provided for outside the Institution. The suggestion of home maintenance has been before the Lord Mayor's Committee on the use of the Titanic Relief Funds, and [illegible] I understand [illegible] support from those who have had the most experience in such matters.

Yours truly, H. J. BROOKE.

[illegible] Road, Herne Hill, London, S.E.

[illegible]

To the Editor of THE MARINE ENGINEER & NAVAL ARCHITECT.

Dear Sir,—Allow me as one who has suffered severely by the loss of a son in the *Titanic* disaster to say that much as I would be pleased to see a monument of a merely spectacular character to the honour of the engineers and electricians of the ill-fated ship, I think it would be better to erect rather a useful character. I have the suggestion to put and if possible endow a home for the widows and orphans of engineers who perish at sea. The names of our sons and brothers and fathers and our own name will soon be forgotten by all but others. For the next generation this will be a matter of little interest, but such a home would be a blessing to bereaved sufferers perhaps for many generations to come.

Yours truly, ALBERT ERVINE.

Merryfield, Old Cavehill Road, Belfast, 17th June, 1912.

WE ARE INDEBTED to Mr. Fleming, chief engineer of the White Star Olympic, for a copy of the Resolution of Sympathy, [illegible] in the Journal of the *Titanic* by the United Engineering Council of Engineers, whose Official Publication is "The Engineer" New York. Resolutions as follows:—"We the members of the Engineering Engineers' Council of Engineers, in meeting assembled, do hereby express our appreciation for the unselfish and excellent [illegible] rendered by our brother engineers in the [illegible] on April the fourteenth, nineteen hundred and twelve, and [illegible] our sympathy to the loved ones of our deceased brothers and [illegible] that they may receive [illegible] [illegible] W. H. Armstrong, J. J. Mary, A. S. Stevens, J. H. McKeown."

TRINITY HOUSE.—At a special general court held on Trinity Monday at the Trinity House, Tower Hill, H.R.H. the Duke of Connaught [illegible] Master and Captain H. Verde Blake, Deputy Master, at the opening [illegible]

THE "TITANIC" DISASTER.

THE great demand for the May issue of this journal having completely exhausted our stock, we have decided, in compliance with numerous requests, to reprint that portion of the May issue giving reproductions of photographs and notes of their careers of Thos. Andrews, Junr., Captain Smith, Lieut. Wilde, and eight members of the [illegible] engineering staff, as follows:—Joseph Bell, W. L. Farquharson, Norman Harrison, J. H. Hesketh, H. R. Dyer, Arthur Ward, William Dixon McKie and William Moyes. Twenty-seven additional photos of the engineers were also included in our June issue, so that in the June and July issues of this journal a complete record of the members of the engineering staff of the *Titanic*, numbering thirty-five, will be found.

THOS. ANDREWS, JUN.

[illegible] All [illegible] passengers put on heavy clothing [illegible] saved their lives. He assisted many women, children to [illegible] deck chairs and other objects to people in water. His chief concern [illegible]

Mr. Andrews was the second son of the Right Hon. Thos. Andrews, D.L., of Conlig, Co. Down, and [illegible] of Lord Pirrie. He was only twenty-eight years of age, thus at an early age a brilliant career has been cut short with [illegible] Mr. Andrews served his apprenticeship with Messrs. Harland & Wolff, and his ability and [illegible] work [illegible] in the firm, [illegible] the big building and repairing undertakings carried out by the firm [illegible] and was further with every [illegible] construction of the leviathan [illegible]

Mr. Andrews [illegible] nature, and his kindly disposition endeared him to all with [illegible] to mourn his loss, and with them and all the [illegible] May the [illegible] by Mr. Andrews [illegible] to comfort the bereaved in their [illegible]

CAPT. SMITH.

The commander of the *Titanic*, Captain Edward J. Smith, R.N.R., was [illegible] a number of the [illegible] Atlantic [illegible] White Star Line [illegible]

in 1887, and has had charge of its largest ships. During the South African War he thrice carried troops in the *Majestic* and was decorated by the Government for his services as transport officer. His career has been one of continuous advancement; each development in size and power of White Star vessels saw Captain Smith taking a step forward in the importance and responsibility of his commands. Passengers liked him, his employers trusted him, because they knew him to be a good sailor and careful navigator. He served as a member of the Executive Council of the Mercantile Marine Service Association, held an extra master's certificate and was an honorary commander of the Royal Naval Reserve. Captain Smith leaves a widow and daughter.

LIEUT. H. T. WILDE.

The appalling disaster to the *Titanic* has taken away, in the person of Lieut. H. T. Wilde, R.N.R., one of the most promising officers serving with the White Star Line. Lieut. Wilde, who was chief officer of the *Titanic*, commenced his sea career in the sailing ships of Messrs. James Chambers and Co., of Liverpool. On the completion of his apprenticeship he secured his second mate's certificate, severed his connection with sailing craft and entered steam. He soon obtained his master's certificate, and joined the White Star Company as a junior officer. Mr. Wilde held an extra master's certificate and had attained the rank of Lieutenant in the Royal Naval Reserve. He was chief officer of the *Olympic* at the time of the collision with the cruiser *Hawke*. He possessed great organizing capacity, and this qualification stood him in good stead as chief officer of these huge liners. He had been in the service of the White Star Line for about fifteen years, and it was understood that he was shortly to be given the command of one of the Company's vessels. He was an officer of merit and deservedly popular, and those who knew him will be satisfied that at the time of trial and danger, he did his duty and died at his post in the spirit of the true British sailor. He leaves four young children, his wife having died several months ago. Lieut. Wilde was thirty-eight years of age.

JOSEPH BELL,

CHIEF ENGINEER.

Mr. Bell, chief engineer of the *Titanic*, was born at Farlam, in Cumberland, and received his education at a school in Carlisle. His apprenticeship was served at the works of Messrs. Robert Stephenson & Co., Newcastle-on-Tyne. He entered the mercantile marine about 1883, and served in vessels owned by Messrs. Lamport & Holt, Ltd. In 1885, he joined the White Star Line, and it is known that he saw service in the following vessels:—*Majestic*, *Britannic*, *Teutonic*, *Ionic*, *Bovic*, *Corinthic*, *Suevic*, *Athenic*, *Celtic* *Cedric*, *Baltic*, *Oceanic*, *Adriatic*, *Laurentic* and *Olympic*, from which vessel he was transferred to the *Titanic*. He had been on both the New York and New Zealand services, and at thirty years of age was Chief in the *Coptic*. Mr. Bell, who was fifty-one years of age, leaves a widow and four children, two boys and two girls; the eldest boy, 16½ years, has recently started as an apprentice in marine engineering at Messrs. Harland & Wolff's, Ltd., and accompanied his father in the *Titanic* from Belfast to Southampton. Mr. Bell was a member of the Institute of Marine Engineers, which Institute he joined in 1891, and was also a member of the Royal Naval Reserve. He was a most capable officer and his loss will be keenly felt among a large circle of relatives and friends.

W. E. FARQUHARSON,

SENIOR SECOND ENGINEER.

Born in 1873, the deceased engineer was the son of the late G. W. Farquharson, who was for thirty years with Messrs. T. B. Royden & Co., shipowners, in Liverpool. Mr. Farquharson served his apprenticeship with Messrs. Higginsons of that town, and afterwards joined the Anglo-American Tool Company. He first went to sea when twenty-two years of age and served in vessels owned by Messrs. Wm. Johnston & Co., Ltd., of Liverpool and London, and later John Markwood, Liverpool. He first joined the White Star Line in 1900, serving as assistant second engineer in the *Teutonic*. He was later transferred to the *Suevic*, and

THOS. ANDREWS, Junr., of Messrs. Harland & Wolff, Ltd.

remained on that vessel for three or four years. His next appointment was to the liner *Majestic*, as junior second engineer, and he afterwards became senior second engineer on the *Teutonic* and later held the same rank on the *Oceanic*. He spent about two months in Belfast watching the building of the *Titanic*, to which vessel he was promoted as senior second engineer. He resided at Southampton and leaves a widow and three children to mourn his loss.

NORMAN HARRISON, A.M.I.Mech.E.,

JUNIOR SECOND ENGINEER.

Mr. Harrison was a native of Liverpool and born in the year 1873. His apprenticeship was served with the firm of Messrs. Higginson & Co., of Liverpool. He first went to sea in a vessel belonging to the Elder Line, Ltd., and he remained with this Company until he passed as Chief Engineer at the age of twenty-three. The White Star Line

Captain E. J. SMITH.

JOSEPH BELL, Chief Engineer

H. T. WILDE, Chief Mate

W. E. FARQUHARSON, Senior 2nd Engineer

then claimed his services as third engineer of the *Delphic*, He next served in the following vessels :—*Athenic*, *Corinthic* and *Ebratic*, on which latter vessel he was senior second engineer. He was finally selected for duty in the *Titanic* as junior second. He was recently admitted an Associate Member of the Institution of Mechanical Engineers. Mr. Harrison leaves a widow, but no children. Both his parents are alive.

J. H. HESKETH.

JUNIOR SECOND ENGINEER.

Mr. J. H. Hesketh entered the service of the White Star Company as engineer apprentice at fourteen years of age, and began his sea-going career as sixth engineer on the *Afric*. He also saw service on the *Cedric*, *Medic*, *Persic* and *Cufic*, and was employed in connection with the salvage of the *Suevic*. While on board the *Majestic* he had charge of the refrigerating machinery and was instrumental in securing a greatly improved quality of cargoes. He was selected for service on the *Laurentic*, and later on the *Olympic* and made some useful suggestions for the machinery spaces in the *Titanic*. He was acting as one of the three second engineers on board the *Titanic*, his *confrères* being Messrs. Farquharson and Harrison. Mr. Hesketh was the youngest acting second engineer in the White Star Line and was a fine steady level-headed man. His last words as he left his home to join his ship were, "Don't fear for me, this ship is unsinkable." He was thirty-three years of age, unmarried, and had his residence, when at home, with his father and mother at Walton, Liverpool.

HENRY RYLAND DYER.

SENIOR ASSISTANT FOURTH ENGINEER.

Was born at Jhansi in India, on December 21st, 1887. He received part of his education at the Manual School, Exeter, and served his apprenticeship with Messrs. Willey & Co.

NORMAN HARRISON, A.M.I.Mech.E., Junior 2nd Engineer

J. H. HESKETH, Junior 2nd Engineer.

H. R. DYER, Senior Assistant 4th Engineer.

ARTHUR WARD,
Junior Assistant 4th Engineer.

WILLIAM DIXON MACKIE,
Junior 5th Engineer.

WILLIAM MOYES,
Senior 6th Engineer.

He entered the White Star service in 1908, and after a short period with the shore staff at Southampton he was appointed to the *Adriatic*, in which vessel he remained for about three years. He was later transferred to the *Olympic* and then to the *Titanic*. His home was at Exeter.

ARTHUR WARD,

JUNIOR ASSISTANT FOURTH ENGINEER.

Age twenty-four years, served his apprenticeship with Messrs. Mitchell Bros., of Romsey, Hants., and Messrs. John I. Thornycroft & Co., Ltd., of Southampton. In 1907 he went to sea in the Siamese gunboat *Suira Monthon*, built by Messrs. Thornycroft, and later entered the service of the White Star Company in 1908. He saw service in the *Teutonic*, *Adriatic* and *Olympic*, from which vessel he was transferred to the *Titanic*, on which ill-fated steamer he met his death on the threshold of his career.

W. D. MACKIE.

JUNIOR FIFTH ENGINEER.

Mr. William Dixon Mackie, who was born in Glasgow, was at an early age brought to West Ham, Essex, where he spent his school days. He served his apprenticeship at the Glengall Ironworks, Millwall, and since the end of his apprenticeship days had been mostly away at sea. He was for a few years in the P. & O. service, leaving that Company to join the White Star Line. Under this Company he served in the *Majestic* and the *Olympic*, and was on board the latter vessel at the time of her collision with the cruiser *Hawke* in the Solent. He was later transferred to the ill-fated *Titanic*. Mr. Mackie was thirty-two years of age and of a bright and cheerful disposition. His wife predeceased him last year and since her death he had taken up his residence when ashore with relatives at Forest Gate, to which district he had moved from Southampton.

WILLIAM YOUNG MOYES,

SENIOR SIXTH ENGINEER.

Mr. William Young Moyes received his education at the Stirling High School and served his apprenticeship with Messrs. David Rowan & Co., of Glasgow. He entered the White Star service and served on the *Oceanic* about three months and was then transferred to the *Titanic*, in which vessel he was senior sixth engineer. He was twenty-three years of age and was the son of Mr. Moyes, headmaster of the Primary High School, Stirling. Mr. Moyes was captain of the football club at Stirling, and the photograph reproduced is taken from a group of the club.

THE "IMPERATOR."

THE Hamburg-American Line has issued a splendidly printed and illustrated souvenir, commemorative of the launching of the largest ship in the world. The progress of construction of the vessel is shown by a series of photographs from the laying of the keel plate up to the time of launching. The accompanying text describes the arrangements for passengers, which have been carried out on a lavish scale. Three wireless operators are to be employed so as to ensure a day and night service. It is pointed out that this is the first German merchant vessel to possess a Gyro compass, and she is the first four-screw turbine steamer of the German mercantile fleet. As mentioned in our last issue, the *Imperator* was launched on the 23rd May from the Vulcan yard at Hamburg. Her length is 881 feet, beam 96 feet, and will carry, when full, over 5,100 persons, including the crew. The vessel will be divided into thirty-six watertight compartments, all of which will extend far above the water-line. It is said that sufficient boats are to be provided to accommodate every person on board in case of accident. The vessel was laid down on June 18th, 1910, and it is expected that it will take about a year to complete her, and that she will take her maiden voyage in the spring of 1913. The vessel has been fitted with the Stone-Lloyd hydraulic system of operating the bulkhead doors. Her two sister ships, laid down in 1911, are being constructed by Messrs. Blohm and Voss. The entire interior surfaces of the enormous bunkers have been coated throughout with Briggs' bituminous enamels and solutions.

THE *Selandia* arrived at Dover on the 19th of June, and proceeded to Amsterdam. Her Captain reported an excellent voyage.

B.O.T. EXAMINATIONS FOR MARINE ENGINEERS.—Messrs. Charles Griffin & Co., Ltd., of Exeter Street, Strand, are issuing a new guide to B.O.T. Examinations for Marine Engineers. The guide is by Mr. R. A. McMillan, B.Sc., Ex. First Class Eng., Head Engineering Master of the Technical School, Bootle. The work is in two parts, each complete in itself. Price 6/- each. Part I. contains calculations for marine engineers, including all the arithmetic for first and second-class certificates, and Part II. includes full information on the use and working of slide valves, indicator and indicator cards, marine steam turbine, ship electric lighting, refrigerating machinery, marine oil motors and oxy-acetylene welding. A companion volume for Extra First Class Engineers is in course of preparation.

MARINE PROPULSION.

(*Continued from page 443.*)

CONTINUING his speech, Sir Marcus Samuel and Messrs. Burmeister & Wain, of Copenhagen, sent a letter to Mr. Fraser Smith which dealt with one of the working costs referred to in Mr. Orde's paper, and without admitting for one moment the accuracy of the calculations put forward by Mr. Orde, he must call attention to one flagrant error where in the oil engine Mr. Orde takes the cost of insurance at £300 per month and the steam engine at £370 per month, but it was quite clear that if the insurance was at the same rate per cent. this item should be £208 per month. And this brought him to the relative cost of construction of the steamer and oil-driven ship. He was firmly convinced that before long internal combustion engines would be constructed at a cost below that of marine engines and boilers as they knew them at present. Why should they not be? For an analogy one has only to look at the development of the motor car. At first a luxury, now, with a better understanding of the question, powerful and splendid engines were built at practically a tithe of the original cost, and he thought it a question of common sense to see that dispensing with the building of costly boilers should place the price of the internal combustion engine at one approximating to the cost of the present type of marine engine without the boilers.

The pioneers of these engines had rightly erred on the side of excessive strength, and, consequently, weight, in the construction of their engines. The diminution of weight was only a question of time, and when that time arrived and the engines could be so placed as not to endanger the trim of the ship, the costly fore deep tank provided by Mr. Orde as necessary in his design would be dispensed with, and the only extra cost of the oil ship compared with the steamer might be that of making the double bottom oil tight, and against which must be set the saving in not having to construct coal bunkers. The oil consumption of the *Jutlandia* was placed at 10 tons per day as compared with a coal consumption of 42 tons per day. The fuel capacity of that vessel was sufficient to take her for 28,500 nautical miles on 1,000 tons of oil, whilst the coal efficiency for 1,000 tons of coal would be 6,850 miles. There were only two other significant features in the ship, and those were that in the oil ship £26 wages per month for the engineering staff was computed, as against a similar item in the steamer of £114, and there was a consequent saving in the catering department, the figures being £24 per month in the oil ship against £39 in the steamer. The cargo deadweight of the oil ship for a voyage of 6,250 nautical miles was 7,105 tons, as against the steamer of 6,210 tons, and the cargo capacity of the oil boat was 351,000 cu. ft., against 304,000 cu. ft.

He was glad to inform the shipowning community that tanks and supplies already existed over the whole of the Eastern hemisphere, and that at a great number of ports large supplies were kept on hand. In California enormous supplies were available at very low prices, the production there being greatly in excess of supplies. In the Gulf of Mexico and at Texas the same condition of things prevails. He (Mr. Orde) based on a proposition that the consumption of coal was only 3:1 of oil was quite erroneous. In reality it had been proved beyond any possible doubt or cavil that in actual practice the ratio was as 1:4, and it was childish to argue that, because both in actual cost and in space required it was one of the overwhelming reasons for the adoption of the internal combustion engine. The Shell Company was prepared to make contracts for oil at all the ports where their fields were geographically favourably placed, at prices which would leave shipowners a profit at the rate of £1 was accepted. Owners need not despair because the price on rail at Oil Storage Work, on the N.E. coast of England was £[illegible] a ton. They must remember that we were going through a period unequalled in the oil trade owing to scarcity of tankers, arising from the constant labour troubles that had prevented, during the delivery of oil tankers under construction, and also affecting the organisation of those responsible for the supply of oil. A ship had just been chartered from an American port to Europe at a cost of [illegible] which was [illegible] and the rates at which [illegible] supply of many fuel supplies could not have been anticipated by them. He had never [illegible] that ships should be built and owners trust to luck for supplies of oil. He readily admitted that the coal trade and the oil trade differed in [illegible] be kept at a price for the one [illegible] knowledge of requirements must be [illegible] for the other; but the present position was [illegible] and in view of the enormous amount of tank tonnage now under construction, he was quite certain that a very heavy reduction of freights would be seen, and with it a return to normal prices for oil. He would say, as a result of the advantages of liquid fuel. On the vital question of the consumption of oil users would be perfectly safe in taking this upon a [illegible] cycle engine as equal to coal [illegible] the work of a ton of coal. It was estimated that the weight of the internal combustion engine, compared with the ordinary marine steam engine, boiler and water, was only two thirds, whilst even as now evolved the saving in space of the one engine compared with the other was material, and would be greatly increased as time showed a simplification of design and structure. Bunker space was entirely saved, the oil being more portably carried and ample sufficient provided in the double bottom of the ship as usually constructed. The latest development shows that the gases generated by the oil engine, and up to now unnecessarily exhausted through a funnel or mast, could be utilised in a [illegible] generating steam, to work all auxiliary machinery, a supplementary pot of liquid fuel being fitted for use whilst in port. The internal combustion engine could be started at a moment's notice, and a material saving in [illegible] from the fact that no steam had to be raised nor any fuel lost while the vessel is in port. An enormous gain of space was made by the saving in boiler and engine room, cutting as it did through all the decks, and provision also having to be made for funnels. The extremely valuable deck space gained in a [illegible] could easily be computed. Nor was that all. The reduction of the personnel now employed in the stokehole might be estimated as at least three little and seeing the difficulty now to provide boat accommodation for every soul on board, this was a material consideration. Seeing that it was more difficult every day to get white men, even from the worst of ports, whilst the laws of Australia called for their exclusive employment, the suggested [illegible] in the use of the internal combustion engine, with the avoidance of coaling and the dangers [illegible] attendant. It was no exaggeration to say that [illegible] of the fuel would be discharging could take a [illegible] oil in a single week to do a seven days' run. The enormous gain in the ship's carrying capacity of deadweight, [illegible] than the equivalent in [illegible] and maintenance [illegible] advantage of the internal combustion engine [illegible] they would carry [illegible] to the most amplified [illegible].

Mr. Armstrong said that [illegible] Borneo engines, but [illegible] Borneo oil, on the other hand, had a carbon base and was

* Referee [illegible] Mr. Arthur Rigg, Mr. Frederick Rigg, Mr. Hugh Strachan, Mr. Frank K. B. Ellis, Mr. Alexander R. Wright, Mr. Montague Cooper, and A. C. Brooke, Esq., of the North East Coast Institution of Engineers and Shipbuilders, Newcastle-upon-Tyne.

a much more satisfactory oil to use, but it had come to his knowledge that even this oil required to be treated before being used in Diesel engines, as he was informed by a good authority that the *Vulcanus* was—at that time—running on a distillate of Borneo oil. He had since learned that the *Selandia* was also running on a distillate; and later, in the "Glasgow Herald" of the 11th May, it was stated that the *Jutlandia* used oil on her trials having a specific gravity of ·855 which corresponded to that of a distillate, and was certainly a long way from the ·93 specific gravity of ordinary crude oil. In Germany, when "crude oil" is spoken of, distillate is really meant. Now this distillate was sold at the present time at 90/- per ton, which, on the basis of coal at 15/- per ton, was six times greater than the cost of coal, and, allowing the Diesel engine to be three times more economical than the steam engine, it would still cost twice as much to run on a distillate. If the foregoing proportions are to hold good it does not seem likely that there was much chance of the wholesale adoption of the Diesel engine in merchant steamers, and geared turbines would appear to hold the field from the point of view of economy of running costs. If crude oil at 65/- per ton was not suitable for use in Diesel engines without being treated, then he thought the fact should be recognised.

Mr. G. F. Tweedy sent a contribution to the discussion, advocating the Diesel engine, and considered that the two-cycle type was the best for marine work. He referred to his firm's experience with the *Toiler*, and stated that they had a duplicate but more powerful vessel in hand, which would shortly be completed.

Other members took part in the discussion, after whom Sir Marcus Samuel, in adding to his previous remarks, said that ten years ago the consumption of petrol in the world was 200,000 tons; now it was 2,300,000 tons. The state of the price of oil was purely transitory. Tens of thousands of tons had been sold for delivery in London up to the end of the present year at 37/6 per ton. There was such an enormous fleet of tankers now building that the present congested position was purely temporary, and they would again see oil down to a price which would allow it to compete with coal. They had to reckon on internal combustion being a very formidable competitor with steam. They must not take the price of coal at Constantinople at 15/-. It was 26/-. They could buy oil there at 35/-, a price which would show an enormous saving. They would have to pay a fair price for coal, but oil would still show an enormous saving to the shipowner. If crude oil had to be supplied, the price in most cases would, he continued, be prohibitive, because crude oil contained a factor of enormous value. The first distillation was petrol and the second was kerosene. The residue was what was sold for those engines. They could not use crude oil. It would be exceedingly dangerous, because there was practically no flash point at all. They must have a certain flash point to use the oil with safety, so that, in a sense, all oil was manufactured. There was a certain amount of truth in the statement as to the pistons of an engine fouling with oil. The Diesel engine had been under trial for a great many years on land but he had never heard of any trouble there, because it was so easily cured. Putting half-a-pint of kerosene into an internal combustion engine on shore immediately had the effect mentioned. Oil engines were now designed so that they could be very easily cleaned. He thought that it was absolutely necessary to recognise that, unless every kind of oil could be used, the movement was doomed to failure. Roumanian, Texas, American and Borneo oils had all been successfully used.

The discussion was brought to a close on the 31st May, when Sir William White wrote saying he had long held that there was a great field for the use of internal combustion engines in ship propulsion, especially in vessels of moderate dimensions or moderate engine-power. On the other hand, there were very serious difficulties in the way of constructing oil or gas engines which could develop great power in individual cylinders. Up till now, engineers had found it safer to use, in the construction of these engines, comparatively small and numerous cylinders in order to reach the very moderate aggregate yet applied in sea-going motor-driven vessels. The practical advantages of the turbine engine were, he continued, undeniable and considerable. If these advantages could be retained in association with equal or less fuel costs, and no less freight-earning capacity than were attainable with internal combustion and reciprocating engines, it was reasonable to anticipate that the oil engine would not have such a walk over in the contest with steam engines as had been predicted, and he could say confidently that no one system of machinery could be proved to be the best for all cases which occurred in practice.

The authors of the papers introducing the discussion on the comparison of the different systems of marine propulsion made a few brief remarks, commencing with Mr. Orde, who said the direction in which designers of Diesel marine engines would doubtless proceed was towards the reduction of revolutions, so as to make speeds of from 10 to 12 knots economically possible in vessels of normal cargo ship forms without the introduction of reducing gear, if possible. Good results in fuel consumption alone were of no real value for cargo ships unless they could be accompanied with a good propeller performance of the utmost simplicity. It was difficult to understand the claim that had been made that the weight of the four-stroke-cycle engine was little, if at all, greater than that of the two-stroke-cycle engine, for it seemed obvious that, with the same revolutions and mean pressure, either the number or the dimensions of the cylinders must be so much greater in the former as largely to outweigh the scavenging pumps on the two-stroke engine of the same power. Whilst it was true that the four-stroke engine had, so far, the largest record at sea, the necessity of producing machinery of large power would arise as soon as the economy and reliability of the Diesel engine were proved, and it was only by developing the two-cycle system that these results could be obtained.

On the point of insurance, he mentioned that he had that day received quotations from insurance brokers which would, to some extent, modify the curves of the Diesel engine at the expense of the steam engine. Underwriters had, apparently, realised somehow that the Diesel engine was coming—he would not say had come—and were quoting the same rates as for steam-driven vessels.

Sir Chas. Parsons dealt with some of the limitations of internal combustion engines, and argued that, from their construction, there did not seem to be much prospect of reduction in price, having regard, also, to the dividends which had been paid by the makers of Diesel engines. He conceded, however, that internal combustion engines were undoubtedly the most economical prime movers, in many cases, for small and moderate powers. As to the geared turbine, the very largest powers could be transmitted at a moderate first cost and upkeep. Further, the tendency of such gears was to improve in use. The overall efficiency of such gears was 98½ per cent. As to the relative extent to which the Diesel engine and the geared turbine were employed, about 107,000 h.p. of geared turbines were at present in use or were building.

Mr. R. J. Walker, joint author with Sir Charles Parsons of the paper on "Geared Turbines," made a comparison of the earning power of the vessel—the type-vessel on which the discussion was based—fitted with geared turbines, and, alternatively, with internal combustion engines, and taking a freight at 7/6 per ton. That would allow, he said, 21·8 per cent. on capital cost with coal at 15/- per ton, and 19·8 with coal at 20/-. It was reasonable to suppose that a shipowner would require at least an equivalent percentage return on the capital value of the Diesel ship to that of the geared-turbine vessel. If they took 20 per cent. return on capital, the working expenses for the Diesel ship would not have to exceed £35,500 per annum, equivalent to 62d. per mile-ton. At that amount, the oil for the Diesel engine would not have to exceed about 20/- per ton. With freight at 10/- per ton, the return on capital in the geared-turbine vessel was 46·7 per cent. with coal at 15/-, and 44·5 with coal at 20/-. Taking 45 per cent. on capital for the Diesel ship, the working expenses would not have to exceed £33,000. or 58d. per mile-ton, which meant that the Diesel ship would require to have oil free of cost.

Mr. Chorlton, of Messrs. Mather & Platt, Manchester, spoke briefly in endorsement of Mr. Holzapfel's championship of the suction-gas engine. He said, parenthetically, that it was wonderful that we had to be taught by Germans. When we could get coal at 10/- per ton which was quite burnable in producers, and compared that price, allowing for thermal values, with oil, it seemed to him astonishing

that more in the way that Mr. Holzapfel had so courageously attempted had not been done.

Mr. Holzapfel stated that [illegible] had done some very good performance, very much better than before. She had made a number of voyages very economically on the very low consumption of about [illegible] per twenty-four hours, [illegible] and doing from [illegible] miles per twenty-four hours, with a displacement of about [illegible]. He admitted that that was a very remarkable performance, and one which tended to prove his case that the suction-gas engine was more economical than either the steam engine or the oil engine. Some gentlemen had referred to the very small size of the vessel and had tried to compare the experiment. He, however, would indicate that [illegible] the results were uncontaminated.

IMMINGHAM DOCK.

IMMINGHAM is only a few miles above Grimsby, and at any state of the tide the great dock can be entered. This is true of no other port on the East Coast. The tracks throughout the dock property are operated by the latest and most approved electric power signalling apparatus.

On the Humber, leading to the dock gates, are two jetties. At the western coaling jetty, vessels can coal without entering the docks, taking from a hoist that can load 500 tons per hour, and which has capacity for 320 loaded wagons on the siding that feeds it. The eastern jetty is for passengers and express traffic.

Guided by the jetties, vessels approach the dock gates. The entrance locks are 840 ft. long and 90 ft. wide. At high water there is 47 ft. on the sill, 27 ft. 6 in. at low water, 30 ft. to 35 ft. within the docks. The central basin is 1,100 ft. square. Each of the two arms of the basin is 1,250 ft. long and 375 ft. wide. Two of these basins are completed, and two will be made when extensions are necessary. In all, exclusive of locks, there will be 45 acres of water in the dock. There will be one mile of dock wall for shipping, and 170 miles of railway within the dock property. The whole of the back of the dock basin is used for coaling, and as coal export is the foundation of Immingham's maritime advantages, the utmost care has been devoted to perfecting devices which will save every possible minute and every fraction of a farthing in the cost of handling the coal. Seven great hydraulic hoists, operating almost automatically, are ranged along the quay. One of them is movable, so that coal can be shot into two holds of a vessel at the same time. The seven coal hoists are capable of shipping at the rate of 5,000 tons per hour. The dock storage facilities will accommodate 174,000 tons of coal.

There is also a graving dock, 740 ft. long and [illegible] ft. wide. The dock has its own power plant for hydraulic power and electricity. Strong hydraulic capstans are placed at close intervals along the quays. The dock property is two and a half miles long with a river frontage of one and a half miles.

The Immingham Dock is already provisionally opened; the official opening will take place on the 22nd July, by the King and Queen.

[illegible]

NON-FERROUS METALS EXHIBITION.

THIS exhibition was opened by the President, Sir Gerard Muntz, on Saturday, 13th June, in the Agricultural Hall, Islington, extending till the 27th. The President [illegible] upon the advantages of the spreading of knowledge of the various metals and processes. At the luncheon, which followed, comments were freely passed upon the difficulties experienced, during recent times, of carrying on works and engagements with the confidence that contracts could be fulfilled, owing to the uncertainty of the labour market. The duty of the Government, or any form of government, regarding the fostering of the life and business of the nation may have party title involved with it, but there would appear to be a limit to the preponderance of attention bestowed upon what are more details of administrations than of vital forces controlling the body politic. Doubtless it may be that nations like enemies get the government they deserve, and although a highly efficient governor is of small value to an inherently wasteful engine, it is of still less value if it requires abnormal power to drive.

Altogether there were about 300 exhibitors, but the exigencies of space preclude our referring to more than have a peculiar interest in marine engineering.

Being the most outstanding, the stand of the Muntz Metal Co. had a comprehensive exhibit of their patent metal in a variety of forged and rolled articles.

Anti-friction metals were naturally much in evidence for bearings, and in small sizes claimed to start in, requiring no machining. A form of metallic packing was exhibited by several firms in the shape of yarn similar to soft cotton packing, this is obtained by running the molten metal on to a fast running pulley, or other surface, and winding the threads so formed off on bobbins as it solidifies, an improvement on the cutting process formerly employed.

Flexible metallic tube produced from solid-drawn red bronze was shown by Messrs. Schultze & Co. to be rendered flexible by a process of corrugating. This tubing can be made to stand the ordinary steam, water and air pressures up to 3 in. diameter, and if necessary may be annealed.

Brass and copper tubes were exhibited by several firms, as well as extruded bars, mouldings, turbine blading, pulleys and ornamental sections, the latter varieties being extensively shown by Messrs. J. Booth & Co. and Messrs. Earle, Beavis and Co. The Muntz Metal Co. and the Yorkshire Copper Works, Ltd., had each a large display, the latter firm showing their "Bemal" tube, specially made for condensers to resist corrosion, as also a compound tube for the same purpose having a copper lining.

Messrs. Dewrance & Co. exhibited only their most recent novelties, these including a form of turbine oil pumps for bearings and cylinders, consisting of a spiral cone rotating [illegible] shaft, an indicator for engine room telegraph or signal director, exceedingly compact and easily manipulated, and an absolute pressure gauge specifically to indicate the condenser pressure independent of barometric variations.

Messrs. Thermit, Ltd., had an interesting cinematograph exhibit of their welding process, and also several metals and alloys produced by their alumino-thermic methods.

The British Aluminium Co. had an extensive exhibit of the uses of their specialities, and the Sulphuhan Metal Co., Messrs. G. Greenwood & Co. and Messrs. Vickers, Ltd., had several forms of alloys of aluminium having advantages in casting, forging, rolling and machining of these products.

The Delta Metal Co. showed some striking exhibits of their patent metal in the shape of heavy forgings and extruded sections. The Delta Metal Co. [illegible] Messrs. [illegible] of the non-ferrous metals were shown in various states of finish and design, illustrating the finish and tools to be guarded against in use and manufacture.

[illegible] July 8th and 9th from 10 a.m. to 5 p.m., with an interval [illegible] for each subject. The examination centres are given as Glasgow, London and Newcastle, to suit the convenience of the candidates.

MARINE MOTOR NOTES.

DURING the passing month of June, a Glasgow firm of shipowners has ordered a 450 ton coaster, to be fitted with Bolinder's engines. The vessel is to be built by the Ardrossan Shipbuilding Co. The launch of the *Eveston*, the Diesel-engined vessel of 3,100 tons deadweight, 275 ft. long, built by Sir Raylton Dixon & Co. for the North American trade, is another mark of the progress of the oil engine. This vessel, when completed, will be placed in competition with a steam-engined vessel of similar dimensions, an interesting and valuable comparison can thus be made. The oil engines are of four cylinders, 20 in. by 30 in., to give, with 115 revolutions, about 1,000 h.p. One feature of note in connection with these engines is that they are an approximation in design to the ordinary marine reciprocating steam engine, having the auxiliaries driven by levers off the main engines. There is said to be a saving in gross weight of machinery over steam of fully 65 tons, in addition to the saving in weight of fuel and of staff in dealing with fuel. In referring to this vessel, Mr. Westgarth, whose firm is building the engines, remarked that it was decided to have the vessel driven by one in preference to two screws; the comparison with the steam-engined vessel will thus be more definite. The *Jutlandia*, in competition with her sister vessel, the *Selandia*, will be a most interesting one to follow, with all the details at hand to show the running of the Continental vessel against the Clyde one. The exhibits promised in connection with the centenary of the *Comet* demonstration to be held on the Clyde at the end of August are to include a model of the *Jutlandia*, as well as relics of the *Comet*, the one the first steam vessel to ply on the Clyde, the other, one hundred years later, the first large venture on the Clyde of the coming type, now on the eve of starting her career. The new oil-engined coasters for the east and west coast of Scotland traffic (The Coasting Motor Shipping Co.) are being launched and fitted with their machinery. Messrs. McGregor, Kirkintilloch, launched the *Innisberg*, at the end of May, so that she will soon be giving an account of herself in the books of the Company, and exciting the poetic fancy of the Kirkintilloch successor to Muir, of "Charlotte Dundas" fame. The new vessel, which is to follow the *Jutlandia*, from Messrs. Barclay, Curle & Co., for the East Asiatic Co., is stated to be designed for a speed of 16 knots, with a tonnage of 8,000, the length being 480 ft. The *Fionia*, for the East Asiatic Co., has been fitted and prepared for the official trials at the end of the month.

THE "CARMANIA."

THE Cunard Line has been unfortunate in having another serious fire on board one of their crack passenger steamships in the Huskisson Dock, Liverpool. The *Carmania* was appointed to take the extra Tuesday passenger sailing of the 4th June, and had loaded a large and important cargo, when, at about five o'clock on the afternoon of Sunday the 2nd, fire broke out in her steerage passenger accommodation and quickly spread to the saloon on the upper deck. The Company's services were quickly at work, and were soon supplemented by those of the Dock Board and of the City of Liverpool Fire Brigade. But it was some hours before the flames were extinguished, and then it was found that a vast body of water had been poured into the hull. The story reminds one of that of the ill-fated *Lucania*, which, under similar circumstances, received such damage as necessitated her being broken up. In the present case, however, the *Carmania* was lucky enough to have her injuries confined to the superstructure, and there is no fear that she will not in a couple of months be able to resume her place on the New York station. At the same time, however, the damage is very heavy, and it will certainly cost not less than £50,000 to make her good. It is understood that in order to save time—which, considering the fact that we are now in the passenger season, is of the highest importance—the contract for the large amount of new furnishing which will be necessary has been given to a well-known firm of furnishers whose house is represented both in Liverpool and London.

THE NEW GERMAN BATTLESHIPS "HELGOLAND" AND "KAISER."

THE attitude taken by the Marine Office regarding the designs of the various battleships and battle cruisers now figuring on the Navy list is both easy to belittle and difficult to explain. That the first Dreadnoughts of the *Nassau* class are comparative failures in many respects is now pretty universally recognised, and the bitter pill that the naval students of the Fatherland had to swallow when they came to compare the fighting efficiencies of their much-vaunted dreadnoughts with their contemporaries in our own fleet was not greatly sweetened by the official apologia for the type. Considering that the hitherto largest war vessels constructed in Germany were the 13,000 *Deutschlands*, it was not greatly to be wondered at that the principles of super-firing and *en echelon* guns were not recognised in the designing of a new class of nearly 18,000 tons displacement (which had to carry twelve big guns instead of four) when time and necessity prevented the construction of a trial ship—such as was our own *Dreadnought*—which could be tested before the rest of the programme was put in hand; the risk of wholesale failure precluded these first four ships being built to some design introducing hitherto untried dispositions of guns and weights. A heavy broadside was necessary, experimental gun positions were debarred, and consequently we find the twelve guns being disposed after the *Deutschland* model, the four 11-in. gun turrets replacing the 6·7-in. at the four corners of the superstructure. Incidentally it speaks well for their designers that such a heavy armament could be carried upon so small a tonnage.

In service the *Nassau's* have proved good steamers, but difficulty has been experienced in keeping the ammunition supply to the twelve 11-in. and twelve 5·9-in. guns regular, while a good deal was found wanting as regards ventilation, etc.

They raised but little enthusiasm in Germany, and it was hoped that the *Helgoland* class which followed them would at least be equal on paper to their contemporaries.

Publication of details of this class by "Nauticus" last year raised a further storm of controversy. At a time when English ships with ten guns were being designed to fire all their armament on either beam, and when the system of super-firing guns had been demonstrated as a practical way for securing enlarged arcs of fire on all quarters, it was hard to have to come down from the super-dreadnought *Helgoland* of "intelligent anticipations" to the actual ship *in esse*; to realize that the *Nassau* disposition of guns had been adhered to and that the 4,000 or so tons of increased displacement only represented the substitution of 12·2-in. for 11-in. guns and the increase in the secondary battery from twelve to fourteen 5·9-in. plus an extra knot in speed. Despite the spirited official championing of the design, few naval publicists maintained that the theory of having the two offside turrets held in reserve was superior in practice to that of bringing all guns to bear on either broadside.

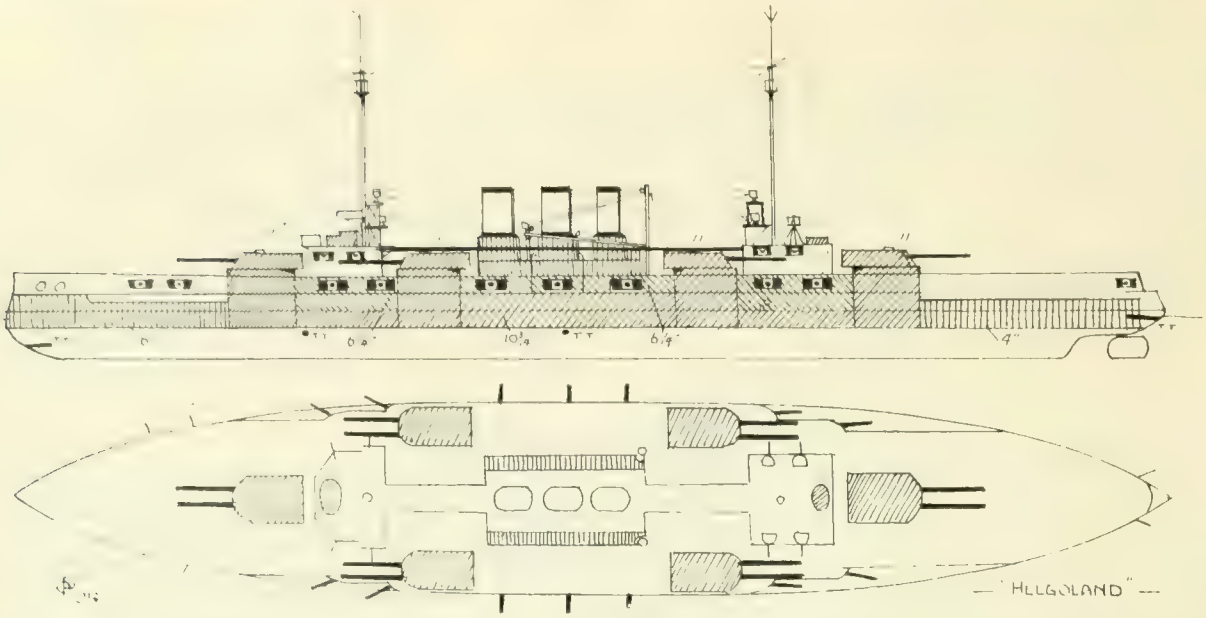
Apart, however, from the initial drawback of uneconomical gun placing, the *Helgoland* and her sisters, *Thuringen*, *Ostfriesland* and *Oldenburg*, are fine ships. Their increased size allows for better protection and spacing of the batteries and a general correction of those bad features in their predecessors which were more or less unavoidable. In appearance they are unique, being equipped with three small funnels bunched together amidships and particularly obtrusive boat derricks instead of the ponderous goose-neck cranes so typical of Teuton warships. In consequence of their funnel disposition they look considerably longer than they otherwise would.

The dimensions are:—Length, 546 ft.; beam, 93½ ft.; draught, 27 ft., figures which are interesting in showing the relatively shallow draught and corresponding increased beam, which are postulated by the waters in which the German Fleet have to navigate; the ratio of length to beam is 5·8 to 1 as compared with the 6·6 to 1 of the *Orion*.

The *Helgoland's* armament consists of twelve 12·2-in. guns, the class being the first ships to mount anything bigger than 11-in. in the German Fleet. The disposition of the six turrets is shown in the illustrations, and it will be readily seen how the fire of the four corner positions is limited to one broadside and axial fire; thus, six guns can be trained ahead

German Battleship *Helgoland.*

German Battleship *Kaiser*



Plan of the *Helgoland*.

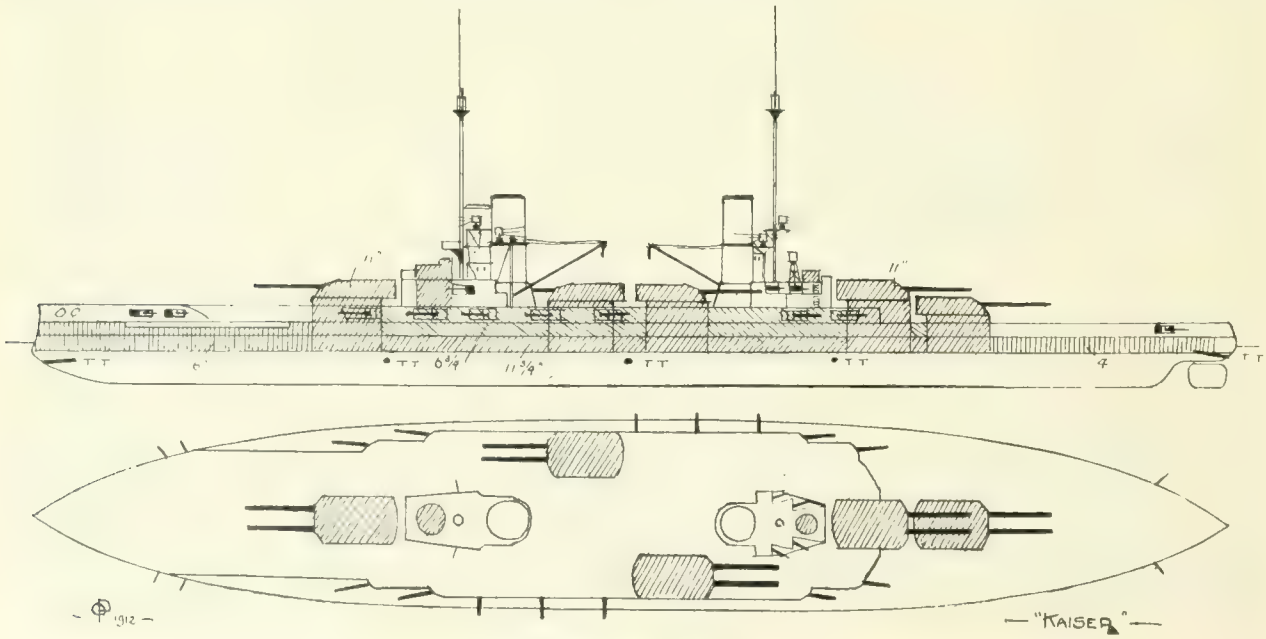
and astern, and eight abeam. In addition to these, a secondary battery of fourteen 5·9-in. q.f. is carried along the main deck, the two guns at either end being recessed to obtain axial fire. This retention of the heavy secondary weapon is one of the best features of German ships as compared with our own, its *raison d'être* being both as an anti-torpedo boat and for use in general action. According to the now accepted theory of German tactics, the battleships will act as masks to the torpedo-craft, covering them until the fleets are within a few thousand yards and keeping up a continuous fire with their primary and secondary pieces as long as the latter remain workable, until all the enemies' anti-torpedo boat guns scattered over superstructure and turret tops are put out of action. The torpedo craft then break away and make a dash for their opponents, which have to depend upon 12-in. gun fire to repel them. So much for theory, but the question remains whether anything protected by less than the thickest armour will survive heavy gun-fire, and whether it is not waste of displacement to include a battery of small guns behind medium armour.

That the utility of the 6-in. for H.M. battleships is not dead is shown by the fact that they are to be reintroduced into the new *Iron Duke* class, now being commenced, some five or six guns being mounted in each battery behind armour.

In addition to her 6-in. guns, the *Helgoland* carries a further twelve 3·4-in. 24-pounders, carried four in the bows, two in the stern and the rest in the superstructures.

Another prominent feature, which throws a light upon the reliance placed by the German naval authorities on the torpedo as an offensive weapon for battle craft, is the large number of torpedo tubes—six in all—which are mounted. The positions of the broadside tubes are approximately shown in the plan, it being difficult to gauge the exact hull section in which they were placed when the ship was seen.

Both the Japanese and Germans are fitting several submerged tubes in their latest ships, while the United States,



Plan of the *Kaiser*.

French and British designs include from two to three apiece. Considering that a few years ago the torpedo tubes were removed from some United States ships as [illegible], the pendulum swing to the other extreme caused by the [illegible] increasing range and accuracy of the later models of torpedo is interesting.

The protection of the *Helgoland* is particularly effective and complete. Practically the full hull is [illegible] at the extremities is armoured, the water line belt being [illegible] ½ in. amidships [illegible] in. forward and [illegible] in. aft. Above this is a second strake of similar thickness, while the battery hull-side is of [illegible] in. and extends between the end turrets. The turret bases are armoured by [illegible] in. to [illegible] in. steel as a precaution in view of the danger that would be caused by the escape of noxious gases from pipes and tubes into the gun flats. The gun turrets and barbettes are [illegible] in. and these latter extend down to the protective deck. The fuel capacity is [illegible] tons of coal with a maximum of [illegible] coal to [illegible] tons of oil. Driven by reciprocating engines of [illegible] i.h.p. the designed speed is 20·5 knots, which has been exceeded on trial by about a knot.

Orion class	[illegible] knots
Helgoland	[illegible]
Thüringen	[illegible]
Oldenburg	22 (reported)

Steam is generated by the Schulz Thornycroft boilers. Owing to their arsenal of artillery, they carry the second complement of [illegible] officers and men, the total cost of each ship being about [illegible] which works out at approximately [illegible] per ton, compared with the [illegible] per ton of the *Orion*.

The four ships were built as follows:—

	Yard. A	Laid down B	Launched C	Trials D	Completion E
Orion and	Wilhelmshaven	Oct. [illegible]	Sept. [illegible]	Aug. 11	Oct. 11
Helgoland	Howaldt, Kiel	Nov. [illegible]	Sept. [illegible]	Aug. 11	Dec. 11
Thüringen	Weser, Bremen	Jan. [illegible]	Nov. [illegible]	Feb. 11	Oct. 11
Oldenburg	Schichau, Danzig	Mar. [illegible]	June [illegible]	[illegible] 12	[illegible] 12

	Yard.	Laid down	Launched	Trials	Machinery
Kaiser	Kiel	Oct./09	Mar. 11	12	Parsons Turbines
Kaiserin	Howaldt, Kiel	Nov. [illegible]	Nov. 11		D.
Prinzregent Luitpold	Germania, [illegible]	Nov. [illegible]	Feb. 12		D.
Konig Albert	Schichau, Danzig	July 10	May 12		D.
Friedrich der Grosse	Vulcan, Hamburg	Oct./09	June/11		A. E. G. Curtis Turbines

The *Kaiser* and her sisters are being built as follows:—

COMPARATIVE TABLE.

	England.	England.	Germany	Germany	U.S.A.	France.	Japan.	Italy.	Austria
Name	*Neptune*	*Orion*	*Helgoland*	*Kaiser*	*Wyoming*	*Courbet*	*Kawachi*	*Dante Alighieri*	*Viribus Unitis*
No. in Class	3	8	4	5	2	4	2	1	4
Displacement	20,000	22,680	22,800	24,500	26,000	23,000	20,800	18,900	20,000
Designed H.P.	25,000	29,000	28,000	25,000	28,000	29,000	26,500	29,000	25,000
,, Speed	21	21	20·5	21	20·5	20	20·5	23	20
	10 12	10 13·5	12 12·2	10 12·2	12 12	12 12	12 12	12 12	12 12
Armament	16 4″	16 4	14 5·9	14 6·7″	21 5	22 [illegible] 5	10 6″	20 4·7″	12 6
			14 3·4	12 3·4″			12 4·7		18 2·9
Torpedo Tubes	3	3	6	10	2	4	5	3	4
Armour Belt	12″	12″	10½″	11¾″	11	10½	12	10	11
Lower Deck Side	9¾	12″	10¼″	[illegible]	1[illegible]5	7	9″	[illegible]	8″
Big Guns	12″-8″	12″-8″	11″	11	12″-[illegible]	[illegible]	9″	[illegible]	11″
Secondary Battery	0	0	6¼	6¼	5″	7½	0	[illegible]	[illegible]
Fuel	900/2,700	1,000/3,700	950/2,700	1,000/3,600	1,500/3,000	950/2,700	900/2,500	1,000/2,500	900/2,500
Launched	1909/10	1910/12	1909/10	1911/12	1910	1911/12	1910	1911	1911/12

PORT OF GLASGOW.—Captain Robert White, harbour-master at Glasgow for thirty-four years, has resigned, and the Harbour Committee have recommended that Captain F. R. Moore, at present [illegible] harbour-master, should be appointed to the position.

WIRELESS TELEGRAPHY.—Mr. Marconi, in his evidence at the *Titanic* enquiry, said he was [illegible] attention to the suggestion to make the [illegible] operating a bell and the [illegible] giving warning that [illegible] and needed assistance. He had confidence that such a suggestion could be carried out.

MOORE JOINTING.—Messrs. Moore & Mitchell advise us that the [illegible] of the Moore Jointing Co., of London and Manchester, has been acquired by them and will in future [illegible] under the management of their well known [illegible] Messrs. Moore & Mitchell trust that by extending to orders prompt attention, combined with the special facilities that they have for punching and stamping out washers, joints, packings, etc., they will be able to [illegible] "Moore" [illegible] packings, as their vulcanized fibre has become as an insulator and for general mechanical purposes.

THE FLEETS OF THE MAIL LINES.

(From our Own Correspondent.)

The Cunard Company.

THE Cunard Company have done a generous thing, and done it in the manner which one would expect a company of their standing to do it. The White Star management having communicated to the Cunard directors their wish to pay such sum as should be deemed just for the detention and other expenses to which the *Carpathia* was put in rendering her services to the survivors of the *Titanic*, the Cunard Company courteously but firmly declined to accept any payment whatever on this account, expressing it as their privilege to have had the opportunity of rendering this Samaritanism of the sea. The White Star people, however, succeeded in obtaining the sanction of the Cunard Company to their offer of a gift of £100 to Captain Rostron, £50 each to the purser, doctor and chief steward, and a month's pay to each other member of the vessel's crew. It will perhaps be remembered that in recognition of the strain which was put upon all concerned the Cunard Company itself had already presented a month's extra pay to each member of the *Carpathia's* crew. Meanwhile, Captain Rostron has been to New York, where he was treated with the utmost honour and presented with a sum of no less than £2,000 sterling, and, in the speech in which he returned thanks for the gift, he stated he proposes to earmark the handsome gift for the education of his three boys. But besides these solid recognitions, the commander of the Cunarder has received other honours. The Liverpool Shipwreck and Humane Society has granted him its gold medal, a much prized distinction. The United States Senate has expressed its thanks for services rendered by him to American citizens, and has further granted him the right to be present on the floor of Congress—one of the highest distinctions which can be conferred on the other side, and one which it is almost if not quite unprecedented to confer on one who, after all, is a foreign subject.

This Company has just sold the twin-screw passenger steamship *Albania*, one of the three vessels they purchased a year ago when they took over the Canadian emigrant trade of the Cairn Line. The vessel, which at the time of sale was lying in the Thames off Southend, is of 7,682 tons gross register, and was built at Newcastle by Messrs. C. S. Swan & Hunter in the year 1900, as the *Consuelo* for the Wilson Line, of Hull. That Company disposed of her to the Cairn Line, who renamed her *Cairnrona*, under which title she was acquired by her late owners, the Cunard Co.

The Lessons of the "Titanic" Disaster

are being felt in various directions. "Boats for all" has been the cry, and boats for all will assuredly be provided in all such passenger steamers as have not already been so equipped, and this whether or no Government regulations are drafted so as to enforce their provision. Then the question of searchlights has been raised both at the American and British inquiries, the finding of the Senate Committee expressly demanding that ships should be fitted with searchlights. Accordingly the Cunard Company—ever in the fore-front where safety is concerned—has fitted a searchlight to their steamship *Mauretania*. Hardly had she sailed with the new appliance when one read in the press that the Commissioners of the River Tees had received from the Union Castle Company a complaint in respect of the use of a War Office searchlight which had been played upon their steamship *Guelph* as she was leaving that river. Captain Strong stated that the lights from the South Gare Fort were cast, in spite of his protests by whistling, ahead, astern and on his vessel, till those in charge of her were almost blinded, and found their navigation seriously hindered by the lights until they arrived off Whitby. The conjunction of the cases is, of course, curious. But it by no means follows that the judicious use of searchlights will be a hindrance to navigation. Indeed it may well be that, properly used, they will be of much assistance.

Buoys to mark Sunken Ships.

Senator Smith, in the report of the American inquiry into the loss of the *Titanic*, made a suggestion that ships should in future carry buoys "to mark the spot of their burial" when they foundered. Strangely enough the report had only been published a few days when the inquiry into the sinking of the French submarine *Vendemiaire* showed the futility of the proposition. This vessel went down close to the land and lay in 26 fathoms of water. Her disappearance was witnessed by a whole fleet of warships, and immediate steps were taken to locate the wreck with a view to possible salvage. Yet owing to the currents which prevail around the spot, the wreck has drifted away, and it is not known where she now lies. This in 26 fathoms! The depth of water over the *Titanic* is enormously greater. A sentimental interest alone could be served by carrying out such a suggestion.

The Isle of Man Steam Packet Company

has, it is reported, acquired an option to purchase the two twin-screw passenger steamships *Duke of York* and *Duke of Lancaster*, which were sold some time ago by the Lancashire and Yorkshire and London and North-Western Railways from their Fleetwood service to the Turkish Government, but which have never yet left the Mersey. The former of the pair was built in 1894 at Dumbarton by Messrs. Denny's, whilst the second was launched a year later at Barrow by the Naval Construction and Armaments Co. They are both speedy vessels, the *Duke of York* having, in 1895, broken the record on the Fleetwood and Belfast route. After a satisfactory trial the option was taken, and the vessels are now added to the Isle of Man Fleet as the *Ramsey* and *Peel Castle* respectively.

The Union Castle Company.

As soon as the management of the Union Castle Company had been taken over by the purchasers, Sir Owen Philipps, the new chariman, set off to South Africa to see if he could arrange terms for the renewal of the mail contract with the Union Government. It appears that the old Board of the Company, though it could not agree with the Government on the question of rebates, did come to an understanding with them as to a rate of freight for cargo sent out on public account. This rate was to prevail for an extended period, of which about six-and-a-half years has still to run. Sir Owen having come to terms satisfactory to the Ministry with reference to the disputed question of rebates, asked that they should arrange the rate of freight for Government stores for this period of six-and-a-half years. But General Smuts thought about half that period as much as it was advisable to give. This concession was not satisfactory to Sir Owen, who promptly left Capetown. But the hitch seems to have since been arranged, and there seems every chance that before he starts for England the whole business will be settled. The settlement will no doubt be satisfactory to the Government and to the steamship people, but at a recent dinner the new chairman of the Union Castle Company pointed out that the abandonment of the rebate system would involve the return to a state of things where fluctuations in rates of freight might be expected, and that this and other factors would probably tend to the advantage of the big shippers and to the corresponding discouragement of the small trader.

The Mariner's Compass.

At Lord Mersey's inquiry there was said the other day by Ernest Gill, second donkey-man aboard the Leyland liner *Californian*, something in the nature of an epigram. He was the man who first disclosed the fact that the *Californian* had sighted signal rockets during the period between the striking of the iceberg by the *Titanic* and her foundering. At first his statement was regarded as incredible, but it has now, of course, been accepted. Asked at the inquiry to give the bearing of what he saw, he replied, "I don't know. I'm not a sailor. *My compass is a steam gauge.*"

Wireless Telegraphy and Compulsion.

The German Government has now followed the example of the United States, Spain, Uruguay and one or two other Governments, and ordered that after the 1st October wireless installations must be provided on all passenger steamships which have on board more than seventy-five persons, including the crew, and also on all cargo vessels having crews of sixty persons or upwards. The German definition of a passenger steamer is one which has at least twenty-five passengers aboard. The minimum range of the installation is to be 100 miles. The ordinance is, however, much less severe than it would appear to be, since exceptions are made in favour

of vessels trading to the Baltic and the North Sea, as well as to the Mediterranean and Black Sea.

Wireless telephony again is to be applied to all passenger steamers and ferry boats plying between Denmark and Sweden.

The Provision of Wireless Telegraphy.

Not only has the United States Government extended its laws as to the provision of wireless installations on board vessels using its ports but it is now taking measures to see that its regulations in this regard are obeyed to the letter. On the 20th June Captain J. D. Johnstone of the Mallory Line steamship *Seminole* was fined at New York a sum of $200 for proceeding to sea without a wireless operator. It appeared that the steamship was outward bound from New York to certain Gulf ports and in fact a qualified operator formed part of the crew. But the man failed to join. The master anchored and waited for him, but night coming on he proceeded on his voyage holding it better to do so than to lie at anchor till the morning. Instructions were sent to the man to proceed south by rail and join his vessel at Brunswick, Georgia, the steamer's first port of call. As however the voyage from New York to that place exceeded the distance within which vessels are allowed to ply without the provision of wireless, there is no doubt that an offence had been committed.

The New Zealand Shipping Company,

having purchased the New Zealand connection of Messrs. Houlder's, has taken over four steamships from their fleet. These are :—

Steamships	Year built.	Gross tonnage	Builders. Type.	New Name.
Ruapehu	1898	6,527	Workman Clark & Co. Single-screw	*Limerick*
Dunedin	[illegible]	[illegible]	Workman, Clark & Co. Twin-screw	*Tyrone*
Paparoa	1903	8,096	Furness, Withy & Co. Twin-screw	*Westmeath*
Otaki	1902	7,387	Workman Clark & Co. Twin-screw	*Roscommon*

It will be noticed that the vessels have been renamed.

Of New Steamship Companies,

the British and Argentine Steamship Company has already a fleet of five steamships. These are the new vessels—

La Cordillera,	twin-screw	1911	A. Stephen, Glasgow.
La Correntina,	,,	1912	Irvine's, Hartlepool.

together with the older vessels—

Corrientes,	single-screw	1900	Jas. Laing, Sunderland.
Orotava,		1902	Northumberland S.B. Co., Newcastle.
Wimbledon,	,,	1900	A. McMillan, Dumbarton.

All these vessels, with others under construction for the line, are fitted for the convenience of meat.

Then there is La Compagnie de Navigation Sud Atlantique, which is about to start a service between Bordeaux and the River Plate with a fleet of passenger steamers. There have already been acquired for the work:

1. *Rio de Janeiro* (ex *Kaiser Friedrich*), twin-screw	..	1897	F. Schichau, Elbing
2. *Orotava*, single-screw		1899	Fairfield S.B. Co., Glasgow.
3. *Staffordshire*, twin-screw	..	1894	Harland & Wolff, Belfast.
4. *Tintagel Castle*, single-screw	..	1896	Fairfield S.B. Co., Glasgow
5. *Ionidis Castle*, single-screw	..	1897	Fairfield S.B. Co., Glasgow.
6. *La Bretagne*, single-screw	..	[illegible]	At St. Nazaire by the Transatlantique Co.
7. *La Gironde*, single-screw	..	[illegible]	At La Seyne by the Mediterranean S.B. Co.

The first of these vessels was, of course, the steamship built for the Nord Deutscher Lloyd and though often reported sold, never yet placed in active employment. The second was an Orient liner, the third a vessel of the Bibby fleet. Numbers 4 and 5 came from the Union Castle Company, and the last two were mail steamers in the passenger service to New York of the Compagnie Générale Transatlantique.

NAVAL MATTERS—PAST AND PROSPECTIVE.

(From our Own Correspondent.)

Portsmouth Dockyard.

THE [illegible] by men [illegible] embark in the steamship [illegible]. The [illegible] most powerful [illegible] will be a unique [illegible] kind of other. The Admiralty yacht *Enchantress*, with the First Lord of the Admiralty on board, arrived from Gibraltar on June 10th. Mr. Churchill, [illegible] London, visited the new battleship *Conqueror* in the docks, the battleship *Iron Duke* in the [illegible] and the battleship *King George V.* completing in No. 5 Basin. The First Lord was here again on June 24th when he visited the battleship *Conqueror* [illegible]. It is probable that the First Lord has been present on each of his visits. The [illegible] that supplementary [illegible] is quite likely that the new battleship which is to follow the *Iron Duke* will be [illegible] intended. A [illegible] *Iron Duke* is to be launched in October. The ship is [illegible] at length [illegible] feet, while the [illegible] will be of [illegible] power [illegible] In connection with the [illegible] of the battleship *Orion* the Admiralty have [illegible] satisfaction with the [illegible] with the approved estimate of the cost of constructing the vessel. With reference to the gun trial at the Orion's [illegible] gentlemen of Gedhaing [illegible] and one afternoon a [illegible] expected to [illegible] the cost [illegible] the ship and [illegible] the [illegible] big guns was distinctly audible 97 miles [illegible]. On May 30th the battleship *Dreadnought* [illegible] the Fleet Squadron after having an extensive refit. The battleship *Hercules*, the flagship of Vice-Admiral Sir John Jellicoe, arrived on June [illegible] which is to be [illegible] at the review. [illegible] and an attachable [illegible] on each side of the forward funnel [illegible] The [illegible] *Lorna* has been sent to Gibraltar [illegible] and the [illegible] *Pandora* is shortly to go to Malta [illegible] A collision between a [illegible] of the torpedo [illegible] Nile and Dockyard Craft [illegible] June 7th. The [illegible] lost. Submarine [illegible] and afterwards [illegible] off Portland, where she was fired at by the battleship *St. Vincent*, which at a range [illegible] and sent her to the bottom.

Devonport Dockyard.

A [illegible] June, when the [illegible] the [illegible] completion of the [illegible] workmen were discharged. Having [illegible] structural alterations necessitated [illegible] rated in the foremost funnel interfering with the work on the [illegible] Dear. On the occasion of the launching of the [illegible] named by [illegible] Angus [illegible] who [illegible] the [illegible] the [illegible] the [illegible] and the [illegible] taken over by the

Admiralty from the contractors. After coaling she went to Bantry to calibrate before joining the First Cruiser Squadron, in which she takes the place of the *Indefatigable* as the flagship of Rear Admiral Bayly. Work on the battleship *Centurion* is making very satisfactory progress. The vessel has been berthed under the 150 ton electrical crane at the North Yard for the turbines and fittings to be fitted in. The work in connection with the boiler uptakes is well advanced, and the funnels are ready for being fitted on board. The battleship *Conqueror*, built and engined by Messrs. Beardmore and Company, returned on June 7th on the completion of her eight-hours' full-power trial, during which, it is stated, the speed attained was 23·5 knots. The vessel proceeded next day to Portsmouth to undergo gunnery, torpedo and other trials after which she returns to the Clyde. The battleship *Hindustan* has arrived from the Thames and has been commissioned. She will be the flagship of Vice-Admiral Prince Louis of Battenberg during the forthcoming manœuvres. The Commander-in-Chief at this port, Admiral Sir William May has been selected to act as umpire in chief during the operations. Good progress is being made with the cruiser *Lowestoft*, which is being fitted out to replace the old cadet training ship *Britannia* at Dartmouth. There appears to be a pressure of work in the constructive department at the Admiralty, and ten draughtsmen are to be sent from the constructive manager's drawing office to Whitehall, their places being filled by the promotion of assistant draughtsmen. An assistant constructor at this yard, Mr. S. McCarthy, has been appointed to the battleship *Colossus* for a year's instruction at sea. The annual dockyard sale is to be held on July 9th and the sale at the victualling yard a few days later.

Chatham Dockyard.

Representations have been made to the Admiralty recently on the subject of additional work, and with good results. So far as can be foreseen, there is every hope that no further reduction in the number of hands will be necessary for some time. The repair programme has been increased by the diversion of the refits of the cruiser *Terrible* and the despatch vessel *Surprise* from Portsmouth to this yard. The latter vessel arrived on June 4th, and when completed it is understood that she will be sent to China to relieve her sister vessel the *Alacrity*, which has been employed in the Far East throughout her career. The *Terrible* arrived on June 13th, and a large amount of work will have to be carried out on her if she is to be put in an efficient condition. Many officers are of opinion that it would be as well if she were relegated to the scrap heap, as she possesses no great fighting value. The mishap to the battleship *Bulwark* had the effect of providing some additional work. Her repairs having been completed, the vessel was commissioned on June 4th for service in the Fifth Battle Squadron, which now consists of the eight battleships of the *Formidable* type. The battleship *Dominion* is undergoing her annual refit, at the conclusion of which she will join the Third Battle Squadron. Later in the year the battleship *St. Vincent* is to be sent here to undergo a refit, but by the time she arrives our new protected cruiser will have been commenced, and this will find work for a large number of men. The battleship *Canopus* and the cruiser *Blonde* have completed their refits, and the destroyers *Beagle* and *Bulldog* and the flotilla cruiser *Patrol*, of the Third Destroyer Flotilla, have come in for docking. The torpedo-gunboat *Sharpshooter* has been paid off and placed in charge of a care and maintenance party. Her crew joined the *Alecto*, the new tender for submarines. The destroyer *Cygnet*, which is undergoing a refit at Haulbowline, is expected here about the middle of July, when she will relieve the *Zebra* for service in the Nore Defence Flotilla. The cruiser *Brilliant*, which returned a few months ago from the North America and West Indies Station, is to be prepared for transfer to the Materiel Reserve. The Admiralty has decided to increase the coal reserves for the local division of the fleet. Coaling parties have been working night and day in discharging a freight of coal which is to be stored at the newly-constructed depôt, where it is understood 100,000 tons will be stored, in addition to the stocks carried by the floating coal depôts in the Medway.

Sheerness Dockyard.

The most interesting event of the month has been the arrival of the floating dock, which has been built by Messrs. Swan, Hunter & Wigham Richardson, of Wallsend-on-Tyne, at a cost of upwards of a quarter of a million sterling. The dock, which has a ground area of about 2½ acres, has been taken to Saltpan Reach, near Port Victoria and berthed at special moorings. The huge structure is said to be capable of lifting a weight of 32,000 tons, this giving it a reserve beyond the weight of the heaviest war vessel in existence. Telephonic communication is established between various parts of the dock, and a flying gangway at the bow end gives access from one side to the other. The dock will be attached to Chatham Dockyard for working, and its lifting powers are to be tested by the docking of one of the battleships of the super *Dreadnought* type. The new floating dock for submarines, which is to be stationed at Dover, has been inclined in the harbour for stability tests, and sinking and docking tests are to follow. The cruiser *Blonde* was in harbour for a few days completing preparations for her departure for Scapa Flow, where the vessels of the First Flotilla were carrying out firing and other exercises. The *Blonde* has replaced the cruiser *Venus* as senior officer's ship, but the latter vessel is to continue to serve in the flotilla as depôt ship until the *Woolwich*, the first depôt ship to be specially built for service with destroyers, is delivered from the works of the London and Glasgow Shipbuilding Company, Glasgow. The cruiser *Iphigenia* left at the end of May for the Shetlands to assist in surveying work there. Torpedo boat *No. 6*, of the Nore Defence Flotilla, and the steam tug *Marmion* employed on the fleet coaling service, recently came into collision as they were leaving the coal hulk *Jumna*. The tug was uninjured, but the torpedo boat had her stem crushed for about ten feet, two feet of the damage being under water, and she was taken into No. 5 Dock for repair. Torpedo boat *No. 34*, which had been carrying out firing exercises in the Firth of Forth, arrived on June 1st and was taken into the steam basin for refit. *No. 36* has also undergone a refit, and both boats have now gone to Chatham to rejoin the Nore Flotilla. Vessels in hand are the destroyer *Foyle* and submarine *C 9*. The cruiser *Astræa*, which has been serving on the China Station for the past eight years, has arrived here to pay off.

Pembroke Dockyard.

The unarmoured cruiser *Fearless* was launched on June 12th by the Hon. Mrs. Guest, wife of Major the Hon. H. Guest, M.P., among those present being Vice-Admiral Barlow, a former superintendent of the yard, Captain-Superintendent Grant, Mr. H. Pledge, chief constructor, who directed the launch, and a number of military officers, in addition to the principal dockyard officials. After the vessel had entered the water three tugs took her to the Carr Jetty, where she will be completed. There has been talk of an effort being made to launch ships of the class in about five months, and we are gradually getting near that time. The *Fearless* has been built in three days under seven months, which is a record for us. The *Blanche* was seven months and sixteen days on the stocks the *Active* seven months and eighteen days, the *Bellona* nine months and five days, and the *Boadicea* ten months and thirteen days. The day after the *Fearless* was launched the first keel plates of the *Nottingham* were laid down in No. 1 slip. The *Amphion*, it may be recalled, was laid down the day following the launch of the *Active* from No. 5 slip last year. The construction of the *Nottingham* will be proceeded with as rapidly as the delivery of materials from the contractors will permit. It is stated that the light armoured cruiser to be built at this yard will shortly be commenced on No. 5 slip. The initial provision for the ship was made in the Estimates, she being one of the eight which are to be built. The sum of £103,800 is to be spent on the vessel this financial year. The destroyer *Waveney* has arrived from Harwich and has been taken in hand for a thorough repair refit, which will include the retubing of the boilers and a complete refit of the propelling and other machinery. The refit of the *Rother* is now practically completed. The destroyer *Swift*, having carried away some of her wireless telegraph fittings on her foremast, called here recently and had a new topmast fitted. The cadets' training cruiser *Cumberland* also recently paid us a visit and remained for five days. During her stay the cadets made a tour of the yard for instructional purposes.

The Thames Built Super Dreadnought *Thunderer* having successfully passed through her trials has now gone into commission. She will be the flagship of Vice-Admiral Prince Louis of Battenberg during the forthcoming manœuvres.

"PALMETTO" PACKING.—It is interesting to note in connection with the completion of the recent very successful full power trial of H.M.S. Lion, [illegible] that her builders, the Thames Iron Works Shipbuilding & Engineering Co., Ltd., purchased "Palmetto" packing for use aboard the super-"Dreadnought" at her trial, and the high record made on the trial would [illegible] that the lubricant of the lubricator was not at least equal in [illegible] to the selection of the rod packing. [illegible] of the present day development with its high pressure and superheated steam, requires a rod packing far different from those that gave satisfaction in the past. [illegible] impossible the using of any packing made wholly or in part of vegetable substance, such as rubber, cotton duck, etc., and even asbestos in its ordinary state quickly hardens when submitted to great heat and pressure. The success of "Palmetto" packing is [illegible] to many severe extreme conditions is because it contains no vegetable substance, and by a special treatment of each single strand with a graphite grease lubricant before putting the packing to harden is removed, the lubricant serving the double purpose of preserving the soft pliable nature of the packing, and so lubricating the rod as to reduce friction heat on the packing and enhance the life of the packing.

OIL ENGINEERING EXHIBITION.—An important exhibition is now being organized having as its object a comprehensive display of oil engineering exhibits forming part of the Hardware Exhibition to be held at Olympia from the 7th to the 17th of September next, and in view of the fact that during the last few years the progress of the various branches of the oil industry has been unprecedented no more opportune time could have been selected for an Exhibition of this description. It will comprise the following sections:—Oilfield equipment; transport facilities, including tank [illegible] tank waggons, etc.; oil fuel systems and appliances; oil engines for power and other purposes; oil [illegible], oil lighting and heating apparatus; oils for [illegible] lighting, burning, lubrication, etc.; the world's oilfields; [illegible] sections, photographic, etc. The organization of the general exhibition is in the efficient hands of Mr. C. D. Sharp, while the special oil and oil-engineering sections will be under the direction of Mr. Sydney H. North, the well-known authority on oil in London. An influential Advisory Council is now in course of formation. The offices of the Exhibition are at 119, Finsbury Pavement, London, E.C., and all further particulars may be obtained from this address.

WAVE MOTION AND MODERN DEVELOPMENTS IN HIGH-FREQUENCY ELECTRICITY.

THE elementary consideration of an oscillation and wave motion demonstrated by models and [illegible] showing longitudinal and transverse wave motion.

The consideration of transverse [illegible] waves in liquids, with illustrations of ripples in water and mercury, showing wave reflection, refraction and interference, and a brief summary of wave motion in canals.

Longitudinal wave motion as set up in gases, showing their similarity to other wave forms, together with reflection of heat waves demonstrated by experiments and [illegible].

The luminiferous æther, touching upon Young's and Maxwell's researches upon the existence of æther waves and the electro-magnetic [illegible] of light.

The electrical condenser and the nature of its discharge, with experiments.

Other means of producing electrical oscillations, [illegible] Tesla coil, etc.

The setting up of stationary waves in [illegible].

The experiments of Hertz, showing wave motion set up in the electro-magnetic medium, illustrated and demonstrated.

The action of the various forms of electric [illegible].

Demonstrations with high-frequency electricity associated with other branches of science.

* Synopsis of course in [illegible] and [illegible] lectures to Marine Engineers at the Exhibition of Navigation, Shipping, Hall, by Mr. A. E. Frame (Member).

MODERN DEVELOPMENTS IN ELECTRO-DEPOSITION.

AT the visit of the Institute of Marine Engineers to the exhibition of non-ferrous metals on Saturday, June 22nd, a paper by Mr. G. P. Lee was read on "Modern developments in the electro-deposition of metals and alloys."

Mr. Lee in introducing the subject, surveyed briefly the historical achievements from the time of Ritter and Davy in the 18th century. Faraday stated the laws of electrolysis as

(1) The quantity of an element set free or deposited by an electric current is proportional to the strength of the current and to the time.

(2) The amount of an element set free or deposited is proportional to its chemical equivalent.

In 1887 Arrhenius enunciated the now generally accepted theory of dissociation.

It is well known that all metals, if immersed in water, will tend to pass into solution due to the solution pressure of the metal; this pressure is constant for each metal for any particular solvent-water or other fluid, and varies with the temperature. At saturation point the solvent by Osmotic pressure resists the solution pressure and no more of the metal will go into solution. The author, to illustrate these phenomena, drew the analogy of the evaporation of water into the atmosphere, the vapour pressure being thus raised to saturation point, evaporation ceased, and enlarging upon the chemical aspect showed the relation existing between the laws of Boyle and Charles for gases and the similar laws for Osmotic pressure.

Zinc, if placed in a solution of zinc salt, will only go slightly into solution, but if placed in a solution of the salt of a metal having a lower solution pressure than itself—such as copper—the zinc will go into solution and copper will be deposited. This being due to an electro-chemical action the zinc can be made to go into solution, if an electric connection be made to the zinc, in a solution of its own salt.

The difficulties experienced in obtaining an even deposit were explained and a reference made to the cyanide process for small articles; this, however, is expensive.

The Marino process was described, using specially prepared borax, with several illustrations of the apparatus used for cleaning, washing, plating in a revolving barrel, washing with hot water, draining and drying with hot air. For larger work the barrel is dispensed with and vats employed, the articles to be treated being conveyed from end to end of the bath.

A rough estimate of the cost apart from establishment and labour charges was given as

1s. 4½d.	per cwt. iron for	$\frac{1}{16}$	in. plate.
7¼d.	,, ,,	$\frac{1}{8}$	in. ,,
3½d.	,, ,,	$\frac{1}{4}$	in. ,,

These being considerably lower than for similar work by the ordinary hot process.

The author criticised the present Government regulations for testing zinc-coated articles and explained that the protection afforded by zinc is due to the formation of an insoluble hydroxide and is altogether independent of the thickness of the deposit, but principally on the even texture of the coating. The test applied is to dip the article in a copper sulphate solution for one minute and then wash, this being repeated four or more times, at the end of which there should be no trace of copper, a test it is claimed which is no criterion of the value of the deposition.

THE annual report of the Mercantile Marine Bureau, Tokio, for the year 1910-1911, recently issued, states that there were at the end of the year 2,545 steamers of 1,233,909 tons, and 6,392 sailing vessels of 413,720 tons registered and unregistered. Compared with the preceding year this was an increase of 179 steamers of 35,715 tons and of 455 sailing vessels of 9,631 tons. The shipbuilding yards, which numbered 230 at the end of the year, showed a decrease of nine. These yards turned out seventy-seven steamers of 24,476 tons and 147 sailing vessels of 11,097 tons. During the year 408 steamers and 255 sailing vessels met with disaster. Over 50,000 vessels entered the open ports. A list of the vessels built under the "Shipbuilding encouragement law" is included in the report.

BRITISH STEAMSHIP CENTENARY.

THE Centenary of the advent of Henry Bell's steamboat *Comet* in the arena of passenger traffic, on the river Clyde, in August, 1812, is to be marked in a number of ways during the corresponding month of this year of Grace, 1912. It is intended that on July 24th, the date on which the launch of the renowned little craft took place at Port Glasgow, in 1812, a "Centenary Exhibition of British Steam Navigation," now being organized by the Corporation of Glasgow and a special Advisory Committee, shall be opened in the palatial Kelvingrove Art Galleries and Museum, while arrangements are also being made to celebrate the Centenary on Saturday, the 31st August (the Glasgow Trades Holiday) by a grand display of shipping at the Tail of the Bank, in which not only the Clyde Trustees, the shipowners and shipbuilders of the district, the shipowners elsewhere whose vessels trade to the Clyde, but the Admiralty (by sending warships of various classes and types) will all take part. There will be processions on the river and on land, organized decorations everywhere (a special feature being the signalizing of the yard at Port Glasgow where the *Comet* was built) and brilliant illuminations at night. Appeals are to be made to the public for funds for the formation of one or more Henry Bell Scholarships in the Glasgow Royal Technical College, and if sufficient funds are forthcoming, a suitable steamship is to be purchased and handed over to the Technical College to be utilised for the training of students in the practical work of engineering and seamanship.

As regards the Exhibition part of the celebrations, the scope of the display will embrace documents, models and relics referring to times prior to Bell's day and success, and extend beyond his day down through all the steps of development to the present time. The accumulation of relics and documents, also, may help very materially to the sifting of evidence as to rival claims by early pioneers, and to reconciling existing discrepancies as to facts and dates in the story of early steam navigation. As an example of the dubiety which still exists, we may instance the matter of the date of the launch of the *Comet*. While July 24th has now apparently won first favour among careful students as the correct date of the launch—and we have tacitly accepted it in writing as above—June 22nd is also frequently stated as the date, and not only so, but January 18th, 1812, has been persistently put forward by writers on the subject.

THE *Arlanza* left Belfast on June 8th for Southampton to take up her position in the R.M.S.P. South American Mail service.

PORTABLE ROCKET APPARATUS.—It has been decided to fit all the Royal Mail Steam Packet Company's passenger vessels at Southampton with the Schermuly portable rocket apparatus.

THE "AQUITANIA."—The Cunard Company have entrusted the order for the apparatus for the disposal of the whole of the ashes from their new vessel, the *Aquitania*, to Messrs. J. Stone & Co., Ltd., of Deptford. Messrs. Stone & Co. have received instructions to immediately put in hand a large number of their new patent hydraulic underline expellers for the vessel. This type of ash expulsion has been exhaustively tested under all conditions of service in the Cunard turbine steamer *Mauretania*.

HOLYHEAD BREAKWATER AND SKERRIES LIGHT.

IN order to make the natural harbour of Holyhead safe for shipping, and protect it from the heavy inroads of the sea, a breakwater was built at a cost of £1,500,000, occupying thirty years in building. The breakwater, which is about 1½ miles long, is constructed of stone taken from a quarry in the adjoining mountain. Some of the blocks are beginning to show signs of the stress of weather, the heavy seas which sweep towards the harbour proved difficult to break and old chain cables have been submerged outside the breakwater to reduce the force. The harbour inside the breakwater has an area of about 260 acres, well lighted with electric lamps. The cost of construction was about £1,300,000.

The breakwater lighthouse at the extreme end was established in 1873. The light is dioptric, flashing every 7½ seconds, red in colour and of 31,000 c.p. It is 70 feet above high water mark and is visible for fourteen miles. The tower is 63 feet high, is square and built of stone. There is communication with the harbour by telegraph for life saving and salvage. A fog bell actuated by machinery sounds three times in succession at intervals of fifteen seconds.

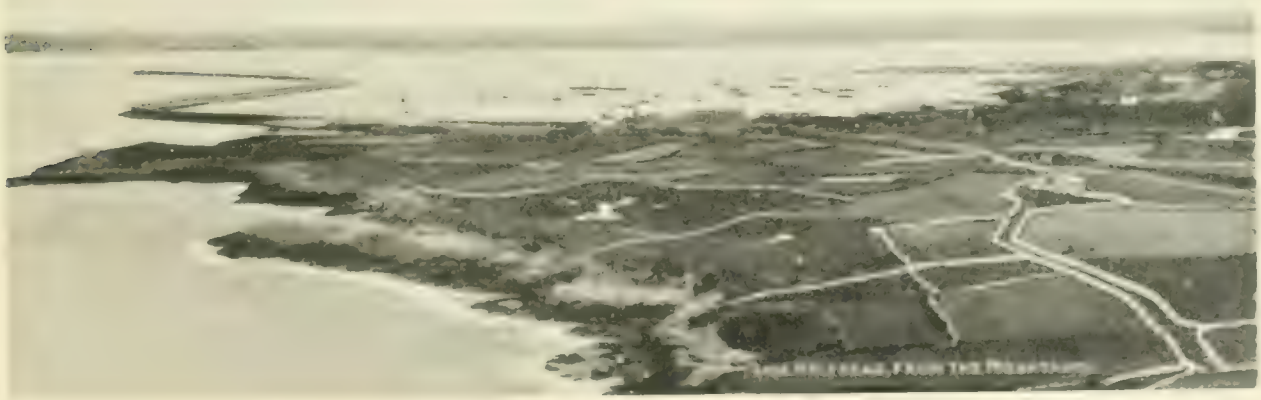
When any of the L. & N. W. R. steamers are in the immediate neighbourhood or expected during foggy weather, signals are sent from the North Stack—an adjoining point of land nearer the Harbour than the South Stack, the lighthouse of which was described in our December issue;—these are responded to from the lighthouse by two explosive rockets fired in quick succession. A gun is also fired in reply to one from the City of Dublin mail steamers to guide them towards the entrance of the harbour.

The Skerries Light off Carmel Point, Anglesea, is in the track of vessels bound round the coast, and the first light placed here was in 1714, reconstructed 1724. It stands on the highest island of the group, which is comprised of several rocky islets. The light (of 274,000 c.p.) consists of two ¼-sec. white flashes,

The Skerries Light

with dark intervals of 2 and 7½ seconds, making a 10-second cycle. It is 119 feet above high water mark and is visible at a distance of seventeen miles. A fixed red light of 4,000 c.p. on the same tower, 86 feet above high water mark and visible fifteen miles, covers the other three rocks of the group. There is also a powerful compressed air syren giving two blasts every 90 seconds, an oil engine supplying the power for 25 lbs. per square inch with storage air tank at 125 lbs. per square inch. The tower is painted white with a red band, and its situation is in long. 4·35 W., lat. 53·25 N.

On the West Mouse Rock a beacon was established in 1840 to mark the Coal Rock for daylight traffic. This beacon, painted white, is 25 feet high, built of stone, and 45 feet above high water level. The Coal and Ethel rocks are guarded for daylight traffic by iron conical buoys, coloured black; the former having a special top mark, it was first laid down in 1840, and lies in 72 feet of water; the latter has no special top mark, the date of its introduction being 1888, this one lying in 62 feet of water.



FOREIGN NOTES.

Austria.

THE *Gallia*, built to the order of the Austrian Lloyd, has just been successfully launched at the San Rocco Shipyard, near Trieste. She is fitted with two triple-expansion engines developing 7,500 h.p., which will give her a speed of 15 knots per hour. The steamer is Austrian built throughout, and will ply between Trieste and Bombay. She will carry passengers, cargo and mails.

Bombay.

The retirement of Mr. F. B. Phillips, engineer superintendent, B.I.S.N. Co., after thirty-seven years' service in India, was celebrated by a dinner given in his honour on May 24th in the Masonic Hall, Bombay, when a goodly gathering assembled to express their hearty greetings and good wishes for a pleasant voyage home to the welcome awaiting him. Mr. R. A. Murdoch presided, and Messrs. R. Spiers and A. Renne served as croupiers. An excellent programme of music, songs and recitations was provided, the toast of the guest of the evening was proposed by Mr. Penny, and that of the ladies by Mr. R. Spiers. Mr. Phillips is now on his way home and is expected to arrive early in July.

China.

The Fore River Shipyard in Camden, N.J., has just launched the protected cruiser *Fei Hung*, built to the order of the Chinese Government. The chief dimensions of the vessel are as follows:—Length 320 ft., breadth 39 ft., draught 14 ft., displacement 2,600 tons, speed 20 knots. She will carry sixteen quick-firing guns and be fitted with two torpedo tubes.

France.

The Chantiers de l'Atlantique have recently launched the screw steamer *Villaret-de-Joyeuse*, built to the order of a French shipping firm. Her dimensions are:—Length 122.5 m., breadth 15.95 m., draught 7.32 m., and her carrying capacity is 7,500 tons. The engines will develop 2,800 i.h.p., giving her a speed of 11.5 knots.

The Channel steamer *Rouen*, built to the order of the Compagnie des Chemins de fer de l'Etat, has just been launched. She is a sister-ship of the *Newhaven*, and is to ply between Dieppe and Newhaven. She will be driven by turbines, and her speed will be 22 knots, the passage across only taking three hours. It is expected that the *Rouen* will be able to take up her service before the end of the year.

The Société de Navigation of Marseilles has just placed an order with the Chantiers de France, at Dunkirk, for a cargo steamer of 3,500 tons, specially fitted up for the transport of waggons.

The Chantiers de France, at Dunkirk, have just launched the cargo steamer *Saint Simon*, built to the order of the Société Navale at Havre. Her engines will develop 1,808 i.h.p., and her speed will be 10.5 knots, and carrying capacity 5,000 tons.

Germany.

The German American Petroleum Company has bought the petroleum steamer *Clio*, of 3,414 tons, belonging to British owners.

The Hamburg Shipping Firm Laeisz has just bought three sailing vessels, so that the firm has now a fleet of twenty vessels of a total of 48,294 tons. Two of these mentioned above were acquired from the Anglo-American Oil Co., of London.

It is reported that the Dortmund Iron Works Union are going to transfer their shipyard to Emden, probably in the month of July.

The Schichau Shipyard and Engineering Works at Elbing has received an order for torpedo boats *S13* to *S24* from the German Admiralty; they are to be completed in the course of 1913. The motive power is to be of the turbine system of Schichau construction.

The *Rheinland* has just been launched by the Vulcan Co. at Vegesack, built to the order of the North German Lloyd. Her length is 149.4 m., width 17.98 m., and at 8.2 m. draught her displacement will be 11,000 tons. There will be six large cargo holds, nineteen winches and twenty derricks to deal with the cargo. Refrigerating compartments are also provided for perishable goods. The steamer is further fitted with electric lighting, wireless, and submarine sounding apparatus. The *Rheinland* will have a speed of 12½ knots, and she will be used on the Australian service. Three sister vessels are also in course of construction in the same shipyard.

The German Admiralty has placed the order for the cruiser *Ersatz Irene* with the "Weser" Company at Bremen. The "Weser" Company has now three cruisers in course of construction, two of which will be completed in a few months.

The Neptune Shipyard has just launched the new steamer *Buchum*, of 6,000 gross tons, built to the order of the German-Australian Steamship Company. Her length is 140.2 m., breadth 17.7 m., draught 7.7 m., at which her carrying capacity will be 10,000 tons. The vessel is fitted with a triple-expansion engine developing 3,600 i.h.p.

The passenger and cargo steamer *Buenos Aires*, of 1,500 tons, built to the order of the Hamburg South American Shipping Company by the Vulcan Shipyard at Vegesack, has just been through her trial runs and proved satisfactory, the engines working well and giving her the contract speed of 10 knots. Her engines develop 4,300 i.h.p., and her dimensions are:—Length 155.45 m., breadth 18 m., draught 8.65 m. The vessel has a carrying capacity of 15,000 tons.

Italy.

A new dock is to be built at Sorrento. It is intended to roof the dock, to enable it to be used as a building dock, to dispense with the operation of launching. The dock is to be 250 m. long and 50 m. wide. The dry dock No. 2 at that place is also to be lengthened from 189 m. to 220 m., and the width is to be increased from 29.9 m. to 38 m.

Japan.

The Admiralty intends laying down the keels for three battleships of the same type as the *Kongo*, which has just been launched at Barrow for the Japanese Government; these are the *Hijei*, at Yokasuka, the *Haruna*, at Kobe, and the *Kirishima*, at Nagasaki. Their completion is to be hurried on by all available means.

Russia.

The Reichsduma has passed the demands of the Admiralty to the full amount of 159,000,000 Roubles (£15,900,000), which will be used for proceeding with the further development of the fleet. Of this sum 24,000,000 will be appropriated for the Black Sea fleet, 5,000,000 for ports, and 54,500,000 millions for the construction of ships. The carrying out of the fleet programme is to be proceeded with as rapidly as possible.

Sweden.

The Reichstag has notified its acceptance of the 12,000,000 Krones which have been collected by the people for the construction of a battleship. The plans of the vessel have as yet not been definitely settled, although it is generally supposed to be a vessel of 7,000 tons with heavy artillery of 15 and 28 cm. guns.

U.S.A.

The Committee of Naval Affairs has brought in a revised Naval Budget providing for the following ships:—Two coal or fuel oil vessels, nine torpedo-boat destroyers of highest speed, one tender for the destroyers, four submarine boats, for which a total demand is made of 118,811,819 Dollars. Further large sums are asked for to carry out various naval works. The Admiralty has directed that the new coaling ships for the fleet are to be suitably constructed to take in coal or oil. The much-talked-of Dock IV. at Brooklyn has now been tested by docking the battleship *Utah*, which occupied three hours in all. It is 728 feet long, 120 feet wide, and can take vessels of 690 feet length, 110 feet breadth, and of 40,000 tons displacement.

THE BOARD OF TRADE will hold enquiries, on the 2nd and 3rd July respectively, into the stranding of the s.s. *Corn Exchange* at North Shields, and into the stranding and loss of the s.s. *Foxley*. The enquiries will take place at Caxton Hall, Westminster.

THE "TITANIC" ENGINEERS.—Mr. Edward B. Caird draws attention to an error in the notice concerning Renney Watson Dodds in our June issue. He was stated to have been a grandson of Mr. Watson, of Messrs. Mirrlees, Watson & Co. We are informed that the only Watson connected with the firm was Sir William Renney Watson, who had no children. It should have been stated that Sir William Watson was Mr. Dodds' godfather, not grandfather. We regret the insertion of the error.

KAISER FRANZ JOSEF I.

Built by the Cantiere Navale Triestino, the *Kaiser Franz Josef I.* is the largest and speediest merchant vessel under the Austrian flag. On trials she developed a speed of 20·5 knots per hour. She left Trieste for her first voyage to New York on 1st June. Length, 500 feet; Breadth, 62 feet; Gross Tonnage, 12,700. A full description of the vessel was published in the October, 1911, issue of this Journal.

BOARD OF TRADE EXAMINATIONS.

MAY 23rd, 1912.—LONDON. *1st Class:* L. Goodman, A. Pearson, J. Taylor. *2nd Class:* A. Cooper, F. Hoad, S. Husk, R. Shaw.

PLYMOUTH. *1st Class:* R. Drew.

BARROW.—*1st Class:* M. Gibson. *2nd Class:* J. Alexander.

NORTH SHIELDS. *1st Class:* J. Bell, A. Piggford, E. Sheldrake. *2nd Class:* J. Davison, N. Dawson, C. Patterson, C. Richardson, W. Robins, J. Smith.

SOUTHAMPTON. *1st Class:* R. Bishop, G. Hayes. *2nd Class:* W. Black, M. MacArthur.

WEST HARTLEPOOL. *1st Class:* F. Calvert, L. Swanwick. *2nd Class:* J. Arnold, J. Campion, N. Craven, G. Hildreth, H. Simpson, H. Walsh.

LIVERPOOL. *1st Class:* A. Aguirre, W. Evans, E. Gebbie, J. Gibbins, E. Smith. *2nd Class:* G. Edwards, G. Tuner, G. Wilson.

CARDIFF. *1st Class:* S. Griffin, A. Walliker. *2nd Class:* H. Coombs, W. Lean, H. Lee, H. Pawley, A. Rowe.

GLASGOW.—*1st Class:* H. Brodie, A. Meil, J. Murray, H. Paterson, J. Wilson. *2nd Class:* W. Crorie, D. Mactaggart, W. Marshall, L. Morris.

LEITH. *1st Class:* A. Aitken, A. Louden, W. Paterson, J. Sharp. *2nd Class:* J. Gray, J. McLaren, C. Morgan, F. Russell.

MAY 30th, 1912. LONDON. *1st Class:* J. Dugdale, T. Freeman, H. Jordan. *2nd Class:* D. Allan, F. Meikle, G. Scott, C. Watkinson.

BRISTOL. *1st Class:* H. Biggleston. *2nd Class:* J. Cavill.

HULL. *2nd Class:* F. Bett, W. Palmer, F. Shepherdson.

ABERDEEN.—*2nd Class:* A. Hay, A. Singer, J. Thomson.

SUNDERLAND. *1st Class:* H. Russell. *2nd Class:* Q. Bell, J. Hodgson.

LIVERPOOL. *1st Class:* T. Davidson, J. Dryden, S. Griffiths, O. Lancaster, J. Mellor, W. Muir. *2nd Class:* C. Jones, J. Sinclair, J. Thomas.

NORTH SHIELDS. *1st Class:* F. Drew, J. Terwell. *2nd Class:* F. Gifford, W. Murray, M. Smith, W. Spence, W. Waters.

GREENOCK. *2nd Class:* D. Forbes, D. Gray, J. Macdougall, G. Redpath.

JUNE 6th, 1912. LONDON. *1st Class:* R. Bell, J. Keith, D. Mair, G. Wilson. *2nd Class:* A. Harris, W. Melmoth, P. Miners, J. Thomson.

BELFAST.—*1st Class:* J. Hay. *2nd Class:* R. Brown, C. Morse.

GLASGOW. *1st Class:* J. Brodie, D. Corstorphine, J. Douglas, G. Macfarlane, A. McLean, J. Rankin. *2nd Class:* W. Herbert, J. Hyslop, W. Murray.

FALMOUTH. *1st Class:* J. Truscott.

LIVERPOOL. *1st Class:* R. Batchelor, F. Fraser, F. Jones, S. Kelly, E. Lawler, C. Moir, P. Mugford. *2nd Class:* W. Cowell.

SOUTHAMPTON.—*2nd Class:* T. Betteridge, C. Glover, J. Roberts, R. Sharpe.

CARDIFF. *1st Class:* T. Brooker, C. Foxwell, G. Jenkins. *2nd Class:* T. Dennis, A. Hunter.

LEITH. *1st Class:* R. Clark, A. Paterson, D. Redfern. *2nd Class:* A. McDonald.

JUNE 13th, 1912. LONDON. *1st Class:* R. Gunston, A. Killick, E. Nimmo, W. Richards. *2nd Class:* M. Blakey, H. Bronsdon, V. Ingram, H. Lambert, W. Martin, N. Morgan, D. White, E. Wood.

GREENOCK. *1st Class:* T. Steel, R. Fraser. *2nd Class:* N. Buchanan, I. Paterson, H. Service.

HULL. *1st Class:* J. Marshall, R. Staton. *2nd Class:* G. Riley.

LIVERPOOL. *1st Class:* A. Cowell, J. Gallagher, E. Lawson, F. McIlgorm, R. Portus. *2nd Class:* G. Bennington, S. Grundy, C. Pickering.

NORTH SHIELDS. *2nd Class:* C. Bell, S. Bolam, H. Glass, G. Laing, H. Macklin, G. Mosley, J. Nicolson, A. Rischmiller, G. Wilhamson, T. Woolgar, G. Wright.

DUNDEE. *1st Class:* G. Ritchie. *2nd Class:* W. Kerr.

REVIEWS.

The Naval Annual, 1912. Edited by Viscount Hythe, Portsmouth. J. Griffin & Co. 12s. 6d. nett.

There appears to have been some possibility that the Naval Annual, which was founded by Lord Brassey twenty-six years ago, would cease to appear after the current issue. We are pleased to learn from the editorial preface that Lord Hythe has happily decided otherwise, having come to the conclusion, "after consultation with naval officers and others whose opinion was of value, that the book was of real service to the Navy and the country, and that the time and trouble devoted to making the information given as reliable as possible were not thrown away." It would indeed have been a great loss to sea literature if this publication, indispensable as it is to every student of naval affairs, had been discontinued, since, although at other times of the year it is supplemented by similar works of reference, none of these can be said exactly to take its place or to provide those features which give it characteristic and special importance. The present issue fully maintains the high standard set by its predecessors, both in regard to the value and variety of the information it contains and as a trustworthy guide upon the subjects with which it deals. In this volume, Lord Brassey submits some suggestions on Naval administration which cannot fail to receive the earnest attention which such a high authority demands and deserves. The Editor is responsible for three chapters, those on the British and Foreign Navies and on Comparative Naval Strength. The year has been one of unprecedented activity in British shipbuilding yards, while abroad all the naval Powers are enlarging their construction. In these circumstances there has been much to chronicle, and these chapters will be found as full and as useful as ever. Among the topical articles which form such an attractive feature of the Naval Annual are Mr. John Leyland's survey of the development of a Naval Staff, and Commander C. N. Robinson's account of the recent naval operations in the Mediterranean. In the former, we have a summary of the recent changes in the constitution of the staff and a comparison with similar institutions abroad, while the writer emphasizes the necessity for protecting the Navy from the danger of the rise of a distinct and privileged class of officers for whom commands and appointments would be reserved. Commander Robinson carries his narrative of the incidents of the Turco-Italian War to the landing of the expeditionary force, and pays a high compliment to the silent, resolute and business-like manner in which the Italian Navy carried out its work. Of more particular interest to our readers will be the two papers by Sir W. White and Mr. Alexander Richardson respectively on "Recent Changes in Warship Design" and "Machinery Problems in High-powered Warships." Sir William White's article, which was written at the special request of the Editor, criticises the "Dreadnought" policy, and his paper has all the weight which attaches to the opinions of so distinguished a naval constructor and ex-Admiralty official. While he acknowledges that this policy has in a measure been adopted by all the principal Sea Powers, he indicates the differences in our own and other ships of the class, and points out that in these vessels the relative increase of beam must involve quickness of rolling motion and less steadiness of gun platform. "This feature of Dreadnought types," he says, "deserves serious consideration when their relative fighting efficiency is being estimated." After directing attention to other disadvantages of the type, Sir William White says, "Would it not be well to reconsider the subject on the basis of a sensible reduction in the total number of heavy guns which should be mounted in an individual ship?" Mr. Richardson, in his illuminating chapter, deals with such technical matters as the best type of boilers, superheated steam, developments in turbines, and electricity as a prime mover. Both from the point of view of reliability and fulness of information, and of clearness and lucidity of style and presentment, Mr. Richardson's article is most valuable. His view is that in high-powered warships such as the battle cruisers boilers with small tubes should be adopted and worked under greater pressure; that oil fuel should be exclusively used irrespective of its first cost; that steam should be super-heated to the extent of 100°F.; and that the combined impulse reaction turbines, with or without power transmission gear, will ensure high economy at reduced as well as full speed. The usual tables, plans and pictures, the section on armour and ordnance, and the appendices are without exception as authoritative, as valuable, and as comprehensive as ever. It is not too high praise to say of the Naval Annual that it is indispensable to all who are interested in the Navy and naval affairs.

Sketches of Engine and Machine Details. By Wallace Bentley, M.I.M.E. Halifax: The Bentley Publishing Co. London: Messrs. Chapman & Hall, Ltd. Price 2/6 nett.

This is the fifth edition of a useful work which was originally published in 1898, and opportunity has been taken to revise the work from end to end, and to add thirty pages of new drawings and further descriptive matter. Some of the older diagrams have been omitted and up-to-date designs substituted. The book is not now divided into elementary and advanced parts, but instead the matter has been sectionalized in a very convenient manner, rendering reference very easy indeed. The book now contains 250 fully dimensioned detail drawings of actual machinery manufactured by some sixty well-known engineers and engineering firms.

Elementary Internal Combustion Engines. By J. W. Kershaw. London: Messrs. Longmans, Green & Co. Price 2/6 nett.

This is a student's first elementary treatise of the construction and working of internal combustion engines and power gas producers, which, when mastered, enables him to proceed to the more advanced books dealing with the subject. The work comprises the construction of large and small gas engines, the governing and charge ignition, the taking of indicator diagrams, the theory or practice of gas producers, the measurement of calorific power, oil and petrol engines, marine oil engines, other combustion motors, and lastly engine efficiency. The work has 174 pages and is illustrated by 117 diagrams. Naturally in a book of this size one does not expect to get a comprehensive treatise on each of the important subjects before-mentioned, but the method of treatment will enable a student to get a general outline of the whole subject, so that he can perfect his knowledge with greater ease from some of the more advanced works on internal combustion engines.

Traité de Métallographie. By Félix Robin. Paris: A. Hermann et Fils. Price 30 francs.

This is a work of nearly 500 pages on the structure of metals, and is illustrated with 244 diagrams and 460 photographic reproductions. The book is divided into nine chapters which deal in turn with the history, general features and methods of metallography; the preparation of specimens and their examination under the microscope, their qualitative analysis and diagrammatic constituents; the method of micro-chemical analysis of alloys; the general structure of metals, and the aspect of their surfaces; the principal constituents of special alloys, such as ferrite, austinite, martensite and many others; the qualitative analysis of the alloys of iron, copper, lead, tin, zinc, aluminium, magnesium, etc.; the physical condition and disposition of the elements in metals, and their defects and causes for same, and, lastly, the slags, dust and other products of metallurgical operations. The author is to be congratulated upon the useful compilation of matter of the greatest value from sources of the highest repute, and the presentation of the subject to the reader in such a manner as to render a progressive acquirement of knowledge in a fairly easy and interesting way. This latter feature is largely brought about by the profuse illustration of the subject by the very numerous diagrammatic and other representations with which the book is furnished, and the cost of such illustration is well repaid by the value obtained in the ready appreciation of the points by the student. The processes described are right up-to-date, which is very important, having regard to the rate of progress which metallurgy makes at the present time, for matters which are new to-day are often superseded by something better to-morrow. We are, therefore, glad to bear our testimony to the value of this book to the really up-to-date student who desires to make the most of the experience of those who have preceded him, whether he is treating the subject from the standpoint of pure science or from that of commercial manufacture.

Conférences sur les Alliages. By MM. Rengade, Jolibois and Broniewski. Paris: A. Hermann et Fils. Price 2d. nett.

This is one of the publications of the Société de Chimie-Physique, and comprises three papers, the first by Mons.

E. Rengade on the thermic method and the micrographic method applied to the study of alloys, and is illustrated by some useful diagrams and photographic reproductions. The first method consists in deducing the composition of the alloy by the simple study of the readings of the thermometer during the solidification of the metal. The second method is the obtaining by microscopic metallography, the characteristics of the alloy, so as to ascertain the different constituents of the alloy. The second paper, by Mons. Pierre Jolibois, deals with another physical method, *viz.*, the chemical, while the third, by Mons. W. Broniewski, deals with the relations between the structure of alloys and their electrical properties. The properties dealt with are five in number, and comprise the electrical resistance of its conductor, the conductivity, the coefficient of the temperature of the resistance, the thermoelectric power, its variation with the temperature and the electromotive force of dissolution. These are dealt with in the letterpress, with the assistance of curves, in a very comprehensive manner, and the deductions are extremely interesting. The three papers together form very instructive reading.

CATALOGUES RECEIVED.

The United Brass Founders and Engineers, Ltd., of Empress Foundry, Cornbrook, Manchester, have issued a very complete catalogue of fittings for steam, water, heating, etc., in gun-metal, brass and cast-iron. Copies of the catalogue will be sent on application.

Messrs. Perkin & Co., Ltd., Lord Street Tool Works, Leeds, catalogue of machine tools and the "Perco" patent packing.

Hans Renold, Ltd., Manchester, deals exhaustively with the firm's steel block chains, for elevating, conveying and feeding purposes.

Crosby Steam Gauge and Valve Co., a pamphlet illustrating a new method of obtaining reduced steam pressure.

Messrs. Lancaster & Tonge, Ltd., Pendleton, Manchester, notes on the construction and working of "The Lancaster" (R.F.M.) Specialties: pistons, steam traps, steam dryers and metallic packings. A frontispiece shows an excellent reproduction of the photograph of Mr. Richard Tonge, head of the firm, now in his eighty-third year.

Maschinenfabrik Thyssen & Co., Aktiengesellschaft, Mülheim, Ruhr. Gas engines.

OBITUARY.

Mr. Aaron Peat.

AT Whitley Bay, Northumberland, on the 2nd June, the death occurred suddenly of Mr. Aaron Peat, age 65, late engine works manager of Messrs. Earle's Shipbuilding & Engineering Co., Ltd. He went to reside at Whitley Bay about five years ago. His remains were laid to rest in the Hedon Road Cemetery, Hull, his native city, and a great number of mourners followed, including superintendent engineers, foremen and workmen, also Brother Masons, representing the local lodges. Mr. Peat was a Past Master of Lodge De la pole 1616.

Capt. Wormald.

At Goole, on the 18th of June, Capt. Samuel H. Wormald, of Clifton Gardens, passed away at the age of 57 years, who had a longer connection with the port than any other local captain. Capt. Wormald was born at Swinefleet, near Goole, and commenced his career in local sailing ships. He afterwards joined the Humber S.S. Co., and on its reconstruction served with the Goole S.S. Co. Latterly he was in command of one of the Lancashire & Yorkshire Railway Company's steamers in the Continental trade.

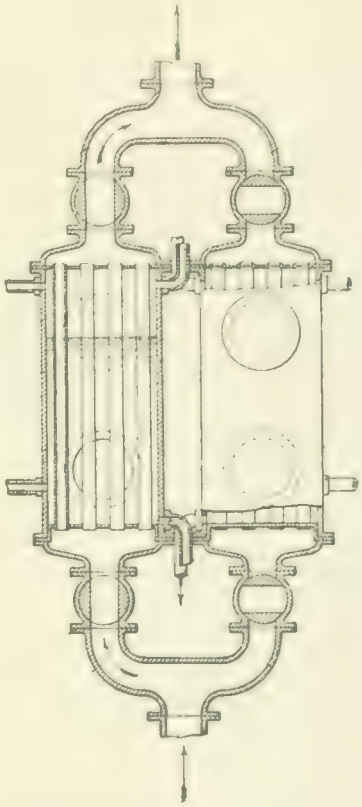
George Busk Crow.

The death occurred on June 12th of George Busk Crow. Mr. Crow was born in Nova Scotia in 1837 and coming to Liverpool at twenty-seven years of age he became a shipowner and merchant, the firm of the late James Moore, Crow, Ruddick & Co. The ships taken in the American Civil War were the first and only captures of prizes made from the ports of Mobile and Pensacola. Although ninety years of age Mr. Crow was active up to the last. In 1900 he was elected Mayor of Birkenhead and was for thirty years a member of the Dock Board, one of the pontoons and dredgers being named after him. He leaves three daughters and one son.

THE HOLZAPFEL PATENT EXHAUST BOILER AND SILENCER.

NOW that the internal combustion engine has taken a distinct hold on the maritime community the direction of effort is indicated to provide means for utilising the heat of the exhaust products, and to conserve such energy to fill up gaps in the duty usually performed by ordinary plant, but which does not apply generally to internal combustion engines.

A good example is the steering engine which is usually worked by steam and which has to be dealt with or some other form of energy utilised, and to solve the problem it is proposed to turn the heated effluent gases from the internal combustion engine



through a special type of boiler so that steam is readily available for any purpose such as that above. We illustrate one of these special boilers in the adjoining diagram, from which it will be seen that the device consists of two separate cylindrical bodies, each having a set of inlet and outlet valves for controlling the passage of the hot gases through tubes passing through the water space of the chambers. The purpose of the duplicate arrangement is to enable either boiler to be used at will, so as to permit the other to be closed down for cleaning and repairs. The boiler is specially designed for use with ordinary sea water, thus avoiding the use of a condenser of any sort. In order to reduce incrustation a continual drip of brine equal in volume to about half that of the incoming sea water is allowed to take place.

As power from the boiler will not be available until some minutes after the main engines have been running, it is suggested that air should be compressed

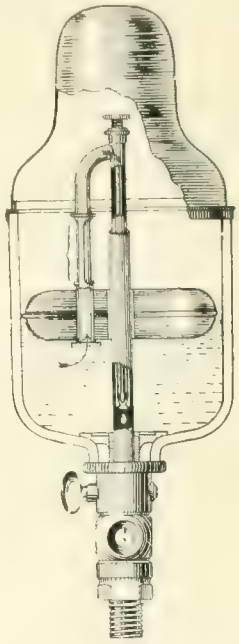
in a storage vessel of sufficient capacity to run the steering engine while leaving port, or an auxiliary oil burner could be utilised for initially generating steam to serve until the main engines have passed sufficient heat on to the boiler to maintain the steam pressure necessary. A point of importance is the proper proportioning of the boiler relative to the volume of gas passed per unit of time so that there is no risk of the formation of sulphuric acid from over-cooled effluent gases within the boiler tubes.

This new type of apparatus is being put on the market by the Holzapfel Marine Gas Power Syndicate, Ltd., of 57, Fenchurch Street, London, E.C.

STERN'S "FLOTTEUR" SIGHT-FEED LUBRICATOR.

ONE of the difficulties obtaining in the ordinary systems of sight-feed lubrication is the want of uniformity of the rate of flow, owing to the change of level of the oil in the container, as the rate diminishes as the level gets lower. It is found that when the container is full the oil flows some five to seven times as quickly as when the container is nearly empty, consequently, if the device is adjusted at the rate of delivery of medium-level, when the container is full, the bearing gets an excess of oil, and when nearly empty, considerably less than is desirable. The method of getting over this difficulty is to maintain, as far as possible, a uniform level by frequently replenishing the oil in the container. Another difficulty is that if any dirt is contained by the oil it will sink to the bottom of the container and will then find its way to the bearings or will choke up the orifices; in either case heating of the bearings results. As the rate of flow is usually adjusted by reducing the size of the outlet, the danger of the supply of oil to the bearings ceasing altogether is considerably increased.

In order to get over these difficulties a new form of sight-feed lubricator has been placed on the market by The Stern Sonneborn Oil Co., Ltd., of Royal London House, Finsbury Square, London, E.C., a diagrammatic representation of which is shown in the accompanying illustration. The container has a vertical upstanding pipe centrally supported, into which is inserted another pipe of inverted U formation, having a float disposed at one of its lower parts and a regulating screw at its upper part. At the lower part of the device is a tap, by which the oil can be held in the upstanding pipe. By means of this arrangement the rate of flow is maintained absolutely uniform, as the action of the lubricator depends upon the suction of the syphon, which takes its supply from the surface of the oil and is independent of the height at which the oil may be standing in the container. As the oil fed to the bearing is taken from near the surface of the container, any dirt which may have accidentally got into the oil will sink to the bottom of the container and remain there, so that it cannot get into the bearings. In order to prevent any foreign particles entering the U pipe, a wire gauze sieve is fitted to the inlet end, and is so arranged as to be easily detachable for cleaning. It is claimed that this type of lubricator, having been once adjusted, requires no further attention beyond refilling when necessary, and the turning of the tap to put the lubricator in or out of action as the case may be, in addition to which it may be pointed out that the device when closed is absolutely dust-proof. In order to start the device the tap is closed and the float removed. The regulating screw is now unscrewed and taken out, and the upstanding tube is filled with oil. The container is also filled to within about a ¼ of an inch of the upper brim. The float is now replaced and is pushed down to the bottom of the container and held there, and the tube is filled with oil through the hole into which



the regulating screw is inserted. When the filling is complete the regulating screw is re-inserted and screwed down tight, and the device is then ready for starting, which is effected by opening the tap as soon as the float has reached its position of normal flotation. The oil flowing through the tap into the sight-feed chamber then draws the oil through the syphon, and such action continues so long as there is any oil left in the container. After the action has been started the regulating screw is opened and regulated to such a position as will give the required number of drops per minute; as the level of the oil in the container drops, so the float drops with it. It will be noticed that the vertical distance between the inlet end of the device and the outlet end of the device always remains constant, thus ensuring a uniformity of delivery.

THE TWELFTH INTERNATIONAL CONGRESS OF NAVIGATION was opened in Philadelphia on the 23rd May by President Taft. The primary object of the Congress is to improve every branch of navigation. Several states and cities have contributed sums to meet the expenses of the meetings. The Congress was divided into two sections, the first section dealing with questions pertaining to inland navigation, and the second section with subjects relating to ocean navigation. Delegates from all parts of the world attended, and a number of papers were read. Mr. J. Foster King, chief surveyor for the British Corporation Register, read a paper on the "Probable dimensions of sea-going vessels of the future." Mr. King, who was a delegate from the Institute of Naval Architects, said that whereas draught was the most economical element in ship construction it was the most costly to canal and harbour authorities, and in such waterways as the Hooghly and Irrawaddy it was difficult to believe that there

would be much, if any, acceleration of the rate of progress. It seemed probable that the 40 feet draught to be given to the Suez Canal, together with the facilities to be given by the Panama Canal would react upon all ships and ports in the direction of more rapid increase in draught. Continuing anticipation to the average rate of past progress, the present draught of 20 to 30 feet would be raised in 1970 to from 27 to 40 feet, for the generality of ocean going vessels. Large Atlantic liners of 900 feet and upwards would require a draught of 1/20th of their length to make them profitable as freight carriers, this corresponding to a draught of 46 feet. It seemed probable that if present lines of development were pursued, the authorities responsible for the development of shipbuilding rivers, canals and harbours who desired to maintain their present relative position, would have to meet continuous expansion, at rates not less rapid than those indicated either by improvement in existing accommodation or by creation of new deep-water ports.

Industrial and Trade Notes.

THE CLYDE AND SCOTLAND.

(*From our Own Correspondent.*)

Messrs. Mechan & Sons, Ltd., of Scotstoun, Glasgow, whose reputation as engineers and manufacturers of specialities in sheet metal has long been unexcelled, are as keenly alive to the march of events and as fully imbued with the spirit of enterprise as if they had still to achieve name and fame. Big contracts for piping, reservoirs, tanks, etc., for conveyance and storage of water, oil and gas have been carried out by the firm for all parts of the world, and without abating their energies in these directions or in connection with the output of steel launches, lifeboats, etc., which has all along formed an important section of their industry, the firm have now added to their works a department for the manufacture of mechanical conveyors and conveying plant to deal with solid and granular matter of all kinds.

Messrs. Charles Connell & Co., Scotstoun, have received orders from a well-known Liverpool line for the construction of two passenger and cargo steamers, each of about 400 ft. in length, the engines for which will be made by a Govan firm.

Messrs. William Simons & Co., Ltd., Renfrew, who have just completed a twin-screw light-draught cutter dredger of the Simons suction reclamation type, named *Campbell*, to the order of the Indian Government for the improvement of the waterways in Burma, have received from the Calcutta Port Commissioners an order for a very large sand-pump dredger. The firm have also received from the London and North-Western Railway Company and the Lancashire and Yorkshire Railway Company, acting jointly, an order for a dredger for service at Fleetwood.

Messrs. Lobnitz & Co., Renfrew, who about the end of May received an order for a rock cutting vessel from the Argentine Government, are at present putting the finishing touches to the steam barge *Hopper No. 10*, which they have built for the Clyde Navigation Trustees.

Messrs. Fleming & Ferguson, Paisley, have received an order from the Calcutta Port Commissioners to build a twin-screw double ladder bucket dredger. The vessel will be capable of dredging 2,000 tons per hour from a depth of 50 ft. below water level.

Messrs. William Beardmore & Co., Ltd., Dalmuir, on May 18th transferred the super Dreadnought battleship *Conqueror* from their outfitting basin to the Firth of the Bank. She left on the 22nd May under charge of a navigating party for Devonport where she will make her official trials. It will be remembered that only sixteen of the twenty destroyers provided for by the estimates for the current year were placed. Two have now been ordered from Messrs. Beardmore and the remaining two have been ordered from Messrs. Yarrow and Co., Scotstoun. On the 8th May the Beardmore firm completed all the official trials of the fast ocean going destroyer *Goshawk*, built and engined by them for the British Admiralty and she left the Clyde for Devonport. The propelling machinery consisted of Parsons turbines with Yarrow water-tube boilers designed for oil fuel, all made at the builders' engine works, Dalmuir. In regard to mercantile shipping the Dalmuir firm have also been busy. On May 24th they launched the twin-screw steamer *Wandilla*, the second of three similar vessels they have on hand for the Adelaide Steamship Co. of South Australia.

Messrs. Ferguson Brothers, Port Glasgow, continue busy in both their shipyard and engineering works with their special lines in dredgers and tug steamers. Recently they completed a powerful tug for the Clyde Shipping Co., this being the eighth vessel of the kind the firm have built for this company. Their latest orders are for two tugs, one for the Natal Commissioners and one for the Port of London Authority. The first mentioned will be one of the most powerful steam tugs of her type ever constructed on the Clyde, and the second will be similar to three other vessels supplied to the same owners. In the way of dredgers the firm have on the stocks a bucket dredger of 1,000 tons capacity for the port of Blyth. It is specially designed for rock dredging and will operate to a depth of 50 ft. Two other items on hand are sand-pump dredgers for the port of Calcutta. In their engineering shops the firm are engaged on as many as ten sets of engines.

Messrs. The Clyde Shipbuilding and Engineering Co., Port Glasgow, who some time ago received from the "Adria" Royal Hungarian Co. an order for a passenger and cargo steamer, have recently received the order for a second vessel for the same Mediterranean service. Both vessels are to be of about 335 ft. in length and will be fitted by the builders with balanced quadruple expansion engines designed to give them a speed of 13½ knots. The firm have also recently received from Messrs. Burns, Philp & Co., of Sydney, N.S.W., an order for a cargo and passenger steamer of about 2,500 tons, intended for the Sydney Company's well-known coasting trade. Still another order has just been booked by the firm, *viz.*, a steamer of 310 ft. length of keel, constructed for passenger and cargo service, for Messrs. Thomas Wilson Sons & Co., Hull.

Messrs. Dunlop, Bremner & Co., Port Glasgow, who since taking over the concern of Messrs. D. J. Dunlop & Co., five or six months ago, have been securing numerous orders, are now engaged upon seven separate contracts. The latest of these is for two steamers, each of about 4,000 tons deadweight for Messrs. Thomas Wilson Sons & Co., Hull. Concurrently with this active state of matters the firm are vigorously proceeding with extensions and rearrangements to their premises. In association with Messrs. Russell and Co., whose large shipyard adjoins, they are forming a deep tidal basin which will be conveniently available to both firms, situated as it is at the junction of the water front of both yards, and when completed the result will be a spacious and very accessible and convenient tidal basin for both firms 266 ft. in width, 20 ft. in depth at entrance, and 13 ft. at head at low water, and with substantial quayage and wharfage sufficient to accommodate vessels of 500 ft. in length at either side.

Messrs. William Hamilton & Co., shipbuilders, Port Glasgow, whose stocks continue to be well occupied with mercantile contracts consisting of steamers built on the Isherwood longitudinal principle as well as on the ordinary system, have recently booked their first contract for the British Admiralty. This is concerned, however, not with ships but with floating docks—a branch of modern shipbuilding work for which the firm have now quite a reputation. The contract in question is for a floating dock capable of lifting vessels up to 2,200 tons displacement and is [illegible] ft. in length by [illegible] ft. in breadth overall, and is used principally for torpedo boat destroyers, submarines and such light craft.

Messrs. Caird & Co., Greenock, who on May 18th launched for the P. & O. Steam Navigation Co. the twin screw steamer *Nankin* of [illegible] tons, built for the intermediate service of the company, have since received from the same company a contract to build and engine two steamers of the *Somerset* class, each of 11,000 tons, for service with the P. & O. Branch line (formerly the Blue Anchor Line) of steamers between Australia and the Cape. Since the purchase of the line mentioned by the P. & O. Co., the total additions to the branch fleet will, with the completion of the two vessels just ordered, amount to five steamers, aggregating [illegible] tons gross. The new P. & O. liner *Malwa* was used as the royal yacht during the voyage of His Majesty King George and the Queen to India, after having undergone alterations at the hands of Messrs. Caird & Co. left the Clyde on June

and in order to commence service in the ordinary sailings of the company. Messrs. Caird & Co., in order to effect a rearrangement of their iron working sheds and so provide greater lengths for their building berths, have begun the work of demolishing old house property to the south of their present boundary, and will enclose the site in their shipyard, thus adding very considerably to their working area and resources.

Messrs. Scott's Shipbuilding and Engineering Co., Greenock, have received an order for a large oil carrying steamer for owners whose names have not so far been mentioned. The vessel is to have quadruple-expansion engines driving a single screw and her boilers will have furnaces fitted to burn liquid fuel. In 1903 Scott's Company built the *Warragansett*, which is the largest but one of the Anglo-American Oil Company's fleet, the largest being the *Loquasa* of 9,202 tons gross, built by Messrs. Harland & Wolff, Belfast. The new Admiralty depot ship for submarines, H.M.S. *Maidstone*, built by Scott's Co., is now about to undergo her official tests, and as she is the first craft of her kind yet constructed on the Clyde extra interest centres in the trials.

Messrs. John Hastie & Co., Ltd., Kilblain Engine Works, Greenock, are at present engaged upon an important extension and rearrangement of their works, whose completion will result in an addition of quite one-fourth to the existing shop area, besides providing most commodious and handsome new offices for both commercial and technical purposes. The latter part of the scheme has already been completed, and this department of the firm's premises has been quite transformed. The conditions under which the commercial and designing work will now be carried on will greatly tend to increased despatch and efficiency in carrying out contracts. In the new additions to the workshop many new and up-to-date tools are being laid down and arranged for. Apart from their ordinary productions in steam steering gears for both mercantile and naval shipping, the firm have a large number of orders for the new Hele-Shaw Martineau electric gear, of which they are the sole makers in this country, and the working results of which on board the Orient liner *Orama*, the oil ship *Zealandia*, etc., have proved most satisfactory.

The Ardrossan Dry-dock and Shipbuilding Co., Ardrossan, through the recent extension made to their dry dock, which is now 310 ft. in length, are now able to deal with vessels of considerably greater dimensions than previously. One of the vessels recently docked was the Cardiff steamer *Ruabon*, 280 ft. in length, this being the largest vessel ever dry docked at Ardrossan. The firm have received from Messrs. Morris, MacNeal & Co., Glasgow, an order for a coasting vessel of about 450 tons carrying capacity to be propelled by Bolinder's oil engines.

Messrs. The Caledon Shipbuilding and Engineering Co., Dundee, have received from the Leyland Line an order for a steamer of 4,000 tons. The vessel will be employed in the passenger and cargo service between Dundee and America.

TYNESIDE AND WEARSIDE.

(From our Own Correspondent.)

Tyneside.

TRADE in this district continues to be very good, there being a large amount of work on hand at all the shipyards and engineering works on the river.

Messrs. Armstrong, Whitworth & Co., Ltd., continue very busy in both yards, and have sufficient work on hand to last for some considerable time.

Messrs. Swan, Hunter & Wigham Richardson, Ltd., have just sent to sea the floating dock for the Admiralty, which is to be stationed on the Medway. This is the third dock the firm have built for the British Admiralty, and has a lifting power of 32,000 tons.

Messrs. Palmers' Shipbuilding and Iron Co., Ltd., continue to be fully employed in all departments, both ashore and afloat.

Messrs. Smith's Dock Company, Ltd., have secured an important ship-repairing contract at their North Shields docks, i.e., the London steamer *Coin Delano*, which sustained heavy bottom damage in the Straits of Magellan. The work will take about a month to complete.

Messrs. Readhead & Sons have plenty of work in progress, and have just placed a contract for a new graving dock with Messrs. Nuttall & Co., of Manchester.

Wearside.

Work continues to be very brisk on the river, all the yards are now working at full pressure on orders in hand, but there are very few new orders being placed at present.

Messrs. Osbourne, Graham & Co. are fitting out the s.s. *Nervion*, and a duplicate vessel, s.s. *Reine*, will be ready for launching in July. These vessels are being built for Norwegian owners, and are both built on the "Monitor" patent principle. They have also two vessels, Nos. 166 and 167, duplicate vessels to the s.s. *Marguerite* and *Marcelle*, which they recently sent to sea, in course of construction. No. 166 is framed, and the keel of No. 167 has just been laid. These vessels are for Fernand Bout, Esq., of Caen.

Messrs. S. P. Austin & Son, Ltd.—Ship repairing has proved very quiet in the north-east coast district owing to the tonnage position, the national coal strike, closing of the Dardanelles, and labour troubles having caused detention, and vessels have been chartered outside their usual trades in the endeavour to get away from the consequent delay following upon the causes mentioned. This Company has, with others, felt the effect of this, and ship repairing has been quiet with them but the prospects are now somewhat better although the summer season is usually a quiet time. A new collier steamer of about 3,000 tons deadweight will be launched during the coming month, and the work on two larger colliers is being pushed forward, although there has been considerable detention owing to the want of material consequent upon the closing of the steel mills. With the return of deliveries to normal conditions the shipbuilding yard of this Company may be expected to be very busy during the greater portion of the present year.

Messrs. Lindsay, Carverhill & Co.—This business has now been turned into a private limited liability company and will hereafter conduct business at their present works under the style of Messrs. Lindsay, Swan, Hunter, Ltd., as engineers and salvage contractors. A large amount of work is in hand for the British Admiralty and for foreign governments.

THE TEES AND HARTLEPOOLS.

(From our own Correspondent.)

Middlesbrough.

Messrs. Sir Raylton Dixon & Co., Cleveland Dockyard, are very busy, having a large amount of work on hand. Among the new contracts reported are two oil steamers, of about 9,300 tons deadweight, for clients of Messrs. H. Moss & Co.

Messrs. Smith's Dry Dock Co., South Bank, have a great deal of old and new work on hand, whilst great alterations and additions are being made to their works.

Messrs. Richardsons, Westgarth & Co. are busy in all departments. They are reported to have secured contracts to supply the engines and boilers for two cargo steamers building locally, and to re-boiler an old compound job about twenty-five years old.

Messrs. W. Harkess & Co. are reported as having secured the contract to build a small steamer for foreign account. They are also busy with both new and old work.

Stockton and Thornaby.

Messrs. Craig, Taylor & Co. continue busy, and have secured the contract to build a medium-sized cargo steamer for delivery next year.

Messrs. R. Ropner & Sons are busy with work on hand, but nothing new is reported during the month, although they are likely to secure an order for foreign account.

Messrs. Richardson, Duck & Co. have secured the contract to build a cargo steamer for local owners.

Messrs. Blair & Co. have many orders on hand, double shifts having to be worked in all departments. The Company have orders on the books which will keep them fully occupied for over twelve months.

West Hartlepool.

The s.s. *Vauxhall Bridge*, 3,395 gross tons, owned by Messrs. W. Gray & Co., has been sold to Messrs. W. S. Miller

and Co., Glasgow, for £[illegible]. The s.s. *Neptune*, [illegible] gross tons, belonging to Messrs. Pyman & Co., has been sold to Spanish shipowners. The s.s. *[illegible]*, [illegible] gross tons, owned by Messrs. W. Gray & Co., has been sold to British shipowners for about £25,500; and the s.s. *Putney [illegible]*, [illegible] gross tons, also owned by Messrs. W. Gray and Co., has been sold to Messrs. Pyman & Co., West Hartlepool, for about £[illegible]. The s.s. *[illegible]*, [illegible] gross tons, owned by Messrs. C. Nielson & Son, has been sold to Aktiebolaget, Swedberg, Mr. R. M. Mellor, and renamed the *[illegible]*. The s.s. *Marie [illegible]*, [illegible] gross tons, owned by the Baird S.S. Co. (Messrs. J. W. Baird & Co.), has been sold to Messrs. Lipberg, Paris, for about £[illegible].

Messrs. W. Gray & Co. have secured the contract to build a large steamer to replace one of [illegible] tons deadweight building to Messrs. Strick & Co.'s order, which has been sold to the Holland-Amerika Line for about £[illegible]. They have now several hulls in various stages of construction building for Messrs. Strick & Co.

Messrs. Irvine's Shipbuilding & Dry Dock Co., Harbour Dockyard, have just launched the s.s. *New [illegible]* for the [illegible] S.S. Co., which is a great credit on this firm, being a beautifully modelled vessel; she is expected to give a good account of herself. They are reported to have secured the contract to build a small cargo steamer, sister ship to the s.s. *[illegible]* recently launched for the Head Line (Messrs. Heyn & Co., Belfast).

Hartlepool.

The Central Marine Engine Works of Messrs. W. Gray & Co. are very busy, and have secured the contract to supply all the engines and boilers for the steamers building by this firm. They are also exceptionally busy in the drop forging department, working night and day.

Messrs. Irvine's Shipbuilding & Dry Dock Co. have a large amount of work on hand. They have just launched the last large twin-screw coal boat for Messrs. Houlder Bros., Liverpool, and are reported to have secured the contract to build a medium sized boat for the same firm, also one for the Manchester Liners, Ltd.

Messrs. Richardsons, Westgarth & Co. are extremely busy, but somewhat hampered owing to the bad delivery of material, also due to the interruption they have had in the roll of the roof of their boiler shop. Among the new orders is repeated a medium-sized cargo boat for Dutch owners. They have a large amount of speciality work on hand, especially condensing plants and evaporators, for at least twelve months to come.

The *El Dorado* has recently undergone her steam trials and maintained a 15.45 knot per hour mean over six double runs, giving every satisfaction.

THE HUMBER AND DISTRICT.

(*From our Own Correspondent.*)

Royal Visit to Immingham Dock. The Great Central Railway Company have now settled a provisional programme in connection with the visit of the King and Queen to open Immingham Dock on July [illegible]. The Royal train will proceed to Grimsby Docks, where the Royal party will alight, and embark on a special steamer. This will only be on a first journey to the Humber, and the Cook opening will be undertaken by the vessel carrying the Royal party, steaming through the lock pits. In this connection it seems odd, at will cost much money to see the celebration on the vessel from Grimsby. Special arrangements will be put into all parts, and extensive arrangements have been devised upon by the Railway Company to deal with the traffic.

South African Trade.—The President of the Hull Chamber of Commerce, [illegible] South Africa [illegible] Hull has been informed [illegible] the Bucknall Line of steamers. The Chamber [illegible] the Secretary of State for Colonies [illegible] the Bucknall Line to the Premier, pointing out that the port was [illegible] more rapidly than any other in the Kingdom, and [illegible] there has been continuous [illegible] Hull and Australia. The letter went on to point to increased trade likely to accrue [illegible] the development of the West Yorkshire [illegible], and promised the support of merchants and manufacturers of the Chamber. Mr. [illegible] acknowledged the letter, and promised to bring it before the Premier.

Canadian Trade. The Furness Line of steamers have opened out a new service from Hull to Montreal. The first steamer to arrive at the port is the s.s. *Alberta*.

The Tourist Season has now begun, and the passenger steamers leaving Hull for Rotterdam, Norway and Sweden, from the Riverside Quay, carry a good number of passengers. The Wilson Line have [illegible] arrangements for catering for the Swedish and Norwegian Coasts.

Black Sea Trade. It is generally expected in the city that there is a new line of steamers about to trade between the ports in the Black Sea and London and Hull.

Trawlers.—During the last month there has been a very good account of [illegible] and from Grimsby and Hull trawling fleets to foreign owners, also a number of trawlers have been sold to Blyth owners to add to their fleet for the coming year.

Messrs. Earle's Shipbuilding & Engineering Co., Ltd., are exceedingly busy with their steamers building and repair work. A very large [illegible] has just gone on for trawlers, which are now [illegible]. The yard of the Wilson Line of [illegible], for three large Mediterranean and Levant steamers, viz., *[illegible]*, is just satisfying. The three cement ships have been fairly well employed with sighting steamers' hulls, propeller work, painting, etc., [illegible] on steamers in the Dock.

Messrs. Cooper & Co., Ltd., engineers and ship repairers, are fairly busy with repair work. The s.s. *[illegible]* has been in the Alexandra graving dock some time now, undergoing extensive repairs in hull bottom, about thirty plates being renewed, keel drawn, new propeller, also engine-room and deck repairs. The *Skipton* has entered No. [illegible] graving dock, Alexandra Dock, having been [illegible], and has undergone extensive repairs to her bottom, etc. The R.M.S.P. *[illegible]* has been docked for her annual Board of Trade and Lloyd's survey and repairs. The [illegible] graving dock is very busy with small coasting steamers and fully [illegible] with repairs. The engine and boiler shops, including the pattern and smith's shops are fully employed, and the [illegible] shop, situated at Alexandra Dock, are all well employed.

Messrs. North-East Coast Engineering Works, Ltd., have had a good month. The s.s. *[illegible]* has just been completed, after undergoing heavy repairs and opening out for Lloyd's No. [illegible] survey. Also repairs on s.s. *Italiana*, *[illegible]*, *[illegible]*, *[illegible]* and tug *[illegible]*. The s.s. *Hawaii Maru* is now in the graving dock under repair. The Company has now opened its [illegible] works at Goole, and are in a position to contract and tender for any steamer work. They are [illegible] repair work from several local tugs and lighter owners at Goole.

Messrs. C. D. Holmes & Co., Ltd., engineers and boilermakers, have had a good month on repair work. The s.s. *Barry Castle*, of Wilson's Barry Steamship Co., has undergone very extensive repairs, hull and boilers and machinery. The branch shop at the Docks has had a very busy month on coal hauling and repair work. The engine shops are busy fitting engines and boilers into new trawlers and preparing for their trial trips, and other companies' special new orders have been booked.

Messrs. Amos & Smith, Ltd., engineers and boilermakers, are working [illegible] and they are [illegible] the [illegible] at hand. The [illegible] are the [illegible] all fully employed and the [illegible] shop. A[illegible] Dock, is also busy with graving-dock work and engine repairs. The [illegible] staff from the Albert Dock [illegible] on the [illegible] of engines, [illegible], etc., for Bright of Liverpool and Lloyd's [illegible]. Orders for new machinery and boilers are [illegible]. The Company, [illegible] in every respect and good [illegible] is given to any work entrusted to them.

Messrs. Stewart & Craig, engineers and ship repairers, have had a good month in general repairs on several steamers. The prospects look [illegible] large turn-over this summer.

Messrs. Woodall & Co., engineers and boilermakers, have had a fair amount of repair work during the month, and the prospects seem to be good for [illegible]. The firm's [illegible] to offer employment on [illegible] for several years [illegible] the [illegible].

Messrs. Cochran & Son, shipbuilders, Selby, are still well booked ahead with orders for trawlers and drifters,

etc., for various fishing ports, including Grimsby and Hull, and all departments are working at full pressure.

Messrs. Cook, Welton & Gemmell, shipbuilders, Beverley, are very busy building trawlers and drifters for Hull, Grimsby and other ports. The firm launched the other day two trawlers of the same dimensions, length 140 ft., beam 24 ft., moulded depth 13 ft. 10 in. They were named the *Ravon Dor* and *Mosoma*, built to the order of the South Western S. F. Co., Fleetwood. Machinery and boilers by Messrs. Amos & Smith, Ltd., Hull.

SOUTH OF ENGLAND AND ISLE OF WIGHT.

(*From our Own Correspondent.*).

Messrs. J. Samuel White & Co., Ltd., East Cowes, Isle of Wight.—Work in connection with the survey of the s.y. *Luna* was proceeding satisfactorily last month, also the s.y. *Onora* completed repairs and left the yard. Further motor launches were completed and sailed for South America. Orders for further new constructions have been booked during the month of June, and all departments continue busy.

Dock Strike at Southampton.—The stevedores and the sailors and firemen of the British Seafarers' Union came out on strike on the 11th of June and at the time of writing other sections of workers had joined them, chiefly members of the Gasworkers' Union and the "Coalies." In consequence of the trouble the White Star Company cancelled the sailings of the *Majestic* and *Oceanic*, and the American Line steamer *St. Paul* was also "held up." Extra police have been drafted into the town, and are in force at the main dock entrances and at various stations within the dock. The Union Castle Company succeeded in getting their *Edinburgh Castle* away on Saturday, the 15th June, as advertised. At the time of going to press the Royal Mail Steam Packet Company had three steamers due to sail, *viz.*, the *Clyde*, *Arlanza* and the *Araguaya*. Crowds of men are continually at the dock gates, including the pickets of the strikers. The men are out in sympthay with the London men, and meetings in support of the cause of the strikers have been largely attended. So far the strike has not affected the stewards. The London and South-Western Company are running a curtailed service, but the trouble is spreading.

Since the above was written the dock strike has collapsed and several of the men who came out have returned, only to find their places occupied by other men and themselves in the position of casuals. The R.M.S.P. Co. got all their ships away and the docks are gradually assuming their normal aspect.

Messrs. Simpson, Strickland & Co., Ltd., Dartmouth.—This firm are at present busy in all departments. Among recent orders are two 85 ft. steel canal barges to be fitted with large crude oil engines of the Bolinder's make. A 30 ft. steel towing lighter and a 45 ft. motor lighter are also on order. A 35 ft. unsinkable boat to be fitted with steam machinery is building for a local gentleman, and some experiments with this boat will be made during the coming summer. Several steam launches are in hand comprising a fine 55 ft. steam launch for a French owner; four 30 ft. steam launches for the White Star Line; a 30 ft. steam launch for Ireland, etc. On the 14th of last month the firm launched the motor yacht *Spanker*. This boat is 40 ft. long, 9 ft. beam and 4 ft. 8 in. deep, and is nicely arranged for cruising. She will be fitted with a 32 b.h.p. petrol motor of the firm's own make. The steam launch *Mouse*, 48 ft. 6 in. long, 9 ft. beam, built of teak and fitted with closed-in triple-expansion engine and water-tube boiler, was delivered last month after successful trials. From the above it will be seen that the firm will have plenty of work in hand for some time to come.

Messrs. Day, Summers & Co., Ltd., Northam Ironworks, Southampton.—Good progress is being made with Mr. Frank Bibby's new 750-ton twin-screw steam yacht, and the shell plating is nearing completion. Messrs. Liebig's new 76-ton tugboat is advancing rapidly, and will shortly be in frame, and work is well advanced on the 60-ton floating sheers. H.M.S. *Magnet* is undergoing extensive repairs, and overhauling. The new coaling shoot and screen for the Phœnix Wharf and Coal Co. is approaching completion. The following yachts have been at the yard for painting and general repairs:—s.y. *Vanduara*, preparing for Kiel regatta; s.y. *Catania* has had new tail shaft fitted and sailed on charter. The s.y.'s *Medusa*, *Gelert* and *Emma* have been slipped and painted and left the yard. The firm have also a lot of work in their foundry and boiler shop, including boilers for the Isle of Wight Co., and the Spanish Government.

Messrs. J. I. Thornycroft & Co., Ltd., Southampton. H.M. ships *Hardy*, *Paragon*, *Porpoise*, *Unity* and *Victor*.—Good progress has been made on these destroyers during the month. Admiralty paddle tugs *Sturdy* and *Strenuous*.—These vessels are now well advanced, and certain of the compartments have been water tested. The main and forecastle decks, deck house and motor-room casing for the Diesel-engined yacht are all erected. Shallow Draught Ferry Steamers.—The firm have received an order from the Port Commissioners for Calcutta for two twin-screw ferry steamers somewhat similar to eleven vessels they have previously built for their service, but of shallower draught. General Repairs.—Several small launches are in hand, and the usual amount of general work has gone through the shops. The repairs department has been well occupied during the past month.

THAMES.

(*From our Own Correspondent.*)

The Transport Strike.—The month has been notable for a strike on the river which at one time threatened to become national. This state of things has been happily averted, however, the action of the leaders here being so far a complete failure. The Government was compelled to call up sufficient police to convey food stuffs from the docks to the markets and the display of force was thus sufficient to quell any chance of rising that there may otherwise have been. In addition the Government set up an enquiry by Sir E. Clarke to investigate the causes of the dispute, and so throughout the month there has been nothing but turmoil reigning in dockland, each side claiming to be in the right and the whole shipping trade once more affected to the detriment of everyone concerned. The shipowners refused to meet the men at a conference, seeing no good in such a step. This was one important feature of the dispute, and another appears to be that the powers that lightermen have hitherto had of being a sort of closed corporation are likely to be broken down and licences given generally to qualified men by the Port of London Authority. When the masters were asked to federate by the Government in order to deal with labour questions in a body they decided that their organizations were too diverse to form such a joint body as that proposed, and the matter therefore dropped. Meanwhile the failure of the men's leaders had caused the men themselves to take up the cudgels in their own behalf and return to their work. The position, therefore, shows the employers to have held their own, the firmness displayed by them conducing to this end.

P. & O. Co.—Reports have again been current of a possible purchase of this Company, but from the Company itself denials have been strong and reassuring, and the Secretary issued a letter to the Press to say there is no authority for the statement. Figures have even been published giving the proposed purchase price for the undertaking, but so far no hint is forthcoming as to who the purchaser is or the cause of the rumour. The charter of the Company is such that it must always remain a British company. This came out in the Secretary's letter referred to.

H.M.S. Thunderer.—The Thames, the place of her birth, has seen the last of this vessel, at least for some time, for being accepted she has proceeded to Devonport to be commissioned and will serve as a flagship for Prince Louis of Battenberg.

MERSEY AND MANCHESTER SHIP CANAL.

(*From our Own Correspondent.*)

MUCH satisfaction is felt in the Mersey district that at last the port has arrived at a stage of industrial peace, and strong hopes are expressed that the many important contracts will now be completed without interruption.

Messrs. Cammell, Laird & Co.—The engineers who have recently been out on strike for the long period of thirteen weeks, resumed work at the firm's terms of one shilling per week increase pending the decision of the Board of Trade to whom the question has been referred for arbitration. The boilermakers, who recently handed in their notices, have come to a satisfactory agreement after conference with the firm, the point at issue being demarkation of work. H.M.S. *Melbourne*, whose sister ship the *Sydney*, is building at Messrs. Beardmore's, was successfully launched at the Tranmere yard on the 30th May, the christening ceremony being performed by Mrs. Braund, wife of a prominent colonial. These vessels are for the new Australian defence scheme, and it is understood will be manned by an Australian crew. It may be of interest in passing to note that their length is 430 ft. and breadth 59 ft. 6 in., and they are expected to have a speed of 25 knots, with a shaft horse-power of 25,000. These are the largest vessels of their class to have continuous side in place of deck armour. It is expected that the Dreadnought *Indefatigable* will also be launched during August. The 32,000 ton floating dock is now practically ready for her lifting trials. The destroyer *Lizard* left for Portsmouth on May 31st. H.M.S. *Kent* is following on June 7th. The Norwegian Atlantic steamer is partly plated and is being advanced as rapidly as possible. The meat barge *Dort* is now ready to take the water, and when complete will be one of the most up-to-date vessels for the transport of chilled meat in shallow waters. The London and North-Western steamer *Governor* is expected to be completed about the end of July. The repair department has been well employed. The Glasgow steamer *Arizona* has had stern repairs due to collision in the Langton Dock. The Cook Steamship Co.'s *Kenmare* is now completed after having new boilers. The steamers *Duke of Lancaster* and *York* have had general overhaul and been taken over by the Isle of Man Co. after successful trials. The same concern's steamer *Prince of Wales* has also had complete overhaul.

Messrs. H. & C. Grayson have been busy with several important contracts, their facilities for quick repairs being always kept up-to-date. The Fleetwood dredger *Poulton* has had heavy repairs and has left for above destination. The Trinity House steamer *Syren* and the Dock Board steamer *Fenwick* have been in hand, the former for redecoration throughout. Other steamers include the *Black Rock*, *Alchymist*, the bucket dredger *Cleveland*, etc.

The Manchester Ship Canal.—Considerable interest was shown in the appearance of a flotilla of Men-of-War, which arrived at Manchester on May 24th via the Canal. The vessels were the cruiser *Bristol* and the destroyers *Imaum*, *Hope*, *Nubia*, and *Zulu*. The *Bristol* was detained at Runcorn Bridge due to having to lower her topmast.

The Isle of Man Steam Packet Co.—The new steamer recently ordered from Messrs. Cammell Laird & Co. will it is now reported, be a summer boat and will embody all the best features of the Company's fleet. The winter or general cargo and passenger fleet will be strengthened by the addition of two steamers, the *Duke of Lancaster* and *Duke of York*, renamed the *Ramsey* and *Peel Castle*.

New Oil Tank Steamer.—The *Cordelia* oil tank steamer recently arrived at Liverpool from the builders, Messrs. Swan Hunter & Wigham Richardson Ltd. for the Oil Tank Steamship Co., of Liverpool. She is the largest oil tanker yet constructed on the Isherwood system, the engine and boiler space being separated from the petroleum by an oil-tight cofferdam. There are seventeen transverse bulkheads and the oil compartments are all fitted with steam pipes for clearing.

The Dee Navigation.—A scheme for the improvement and canalization of the Dee has been prepared by the Dee Conservancy Board's engineer and approved by the various rural boards interested. £[illegible] will be granted by the Developments Commissioners and £45,000 will be raised by the authorities interested.

NORTH-WEST OF ENGLAND.

(*From our Own Correspondent.*)

Barrow.—There is no break in the activity which prevails in the shipbuilding trade of Barrow. Messrs. Vickers, Ltd., are very well off for orders, having, indeed, probably more work in hand than any other firm engaged in the trade at the moment, and all the orders are of first importance. These include the battle-cruiser *Princess Royal*, the battle-cruiser *Kongo* for the Mikado's Government, the super-"Dreadnought" *Reshadieh* for the Turkish Navy, the super-"Dreadnought" *Delhi* for the British Navy, three river gunboats for the Brazilian Government, a tender for the British Government, a large floating dock for Canada, capable of lifting 27,000 tons, a passenger tug for Rio de Janeiro, and other craft. On the engineering side of the works the orders in hand for engines, gas producers, oil engines, and propelling equipment more than ever before in the hands of the firm at any one time in its history. The works have been again extended, especially in the engineering department, and still further extensions have been determined on, while other extensions are under consideration. The works at Barrow have been extended and improved ever since Messrs. Vickers, Ltd., took possession of them, and as one extension has been completed something further has rendered it necessary to still further improve the works. This position has arisen mainly because orders have come more frequently to hand, and also because of the policy of the directors to have every department quite up to date. The firm has in view many more extensions, and these will be tackled as soon as the absolute necessity for them is demonstrated.

Launch.—The tugboat built at Barrow by Messrs. Vickers, Ltd., for the Brazilian Government, was launched on the 18th of June, and was named *Gustavo*. She is 128 ft. long, 25 ft. broad, and 14 ft. depth moulded, built to Lloyd's regulations and special survey, and 100 A1 for tug purposes. Her engines will develop 1,200 horse-power, which will propel the vessel not less than 10 knots per hour. A motor-boat, built by Messrs. Vickers, Ltd., for the Admiralty, is ready for launching, but her machinery is not quite ready for her. She is only a small craft, but it is expected she will be the forerunner of many similar vessels for His Majesty's Navy.

H.M.S. "Princess Royal."—The work on this battleship-cruiser is being pushed forward with all speed. To some extent delay was caused by the question as to the trials of her sister ship H.M.S. *Lion*, after the alterations, but these having proved very satisfactory, there is now a rush to complete the *Princess Royal* as soon as possible. It is expected she will be ready for her trials in August. The alterations which the trials of H.M.S. *Lion* proved to be necessary will necessitate considerable changes in the ship. To begin with her funnels will be much more lofty, and the forward funnel especially so, while her navigating bridge and fire direction arrangements will stand much higher than in any ship in the British Navy.

The Japanese Battle-Cruiser "Kongo."—Now that this vessel is alongside the 200-ton crane in the Buccleuch Dock fitting-out berth, the work of completing her for early service is progressing very satisfactorily, and quite an army of men are employed on the vessel in her engine and boiler-rooms, and in other parts of the ship, as she is required for delivery at an early date. The firm are anxious to deliver as early as possible, as two super-"Dreadnoughts" have to take her place towards the end of the present year in the fitting-up wharf in the Buccleuch Dock.

The Montreal Dock.—This floating dock would probably have been launched before this had it not been for the difficulty of getting an adequate supply of platers and rivetters, but the work is now well advanced, and the vessel will be launched in sections next month, and then rivetted together. She will then proceed in charge of powerful tugs to Montreal, so as to enter the river St. Lawrence and proceed up to her station before the navigation sets in. She is a monster dock, and is being fitted up with the most convenient and up-to-date arrangements for the purpose she has to serve.

The Turkish "Dreadnought."—Very considerable progress has been made in the construction of the hull of the Turkish super "Dreadnought" *Reshadieh V.*, and quite an army of rivetters and platers are employed on her. She has to be delivered in twenty-two months from the date of laying her keel, and this contract necessitates careful consideration of all details so as to dovetail the work into a continuity of progress.

H.M.S. "Delhi."—In the early part of June, Mr. A. W.

Clarke, Inspector for the Admiralty, laid the keel at Barrow of H.M.S. [illegible], a super "Dreadnought" which is under contract to be built in two years. Much of the material required was ready to hand when the keel was laid, and since then a very marked progress has been made in the work of construction. Certain changes have been made in the yard with the view to the more effective and real progress of the work in hand, and it is expected these arrangements will facilitate the completion of orders more quickly than has hitherto been possible.

Shipbuilding Material.—Ship plates are at £7 17s. 6d. to £8 8s. 0d., and boiler plates £8 1s. 6d. to £8 12s. 6d. The Barrow plate mills are now well supplied with orders.

Hæmatites.—The hæmatite iron trade is booming. Prices are firm at 73s. - nett f.o.b. for mixed Bessemer Nos., and 72s. 6d. warrant sellers cash.

BELFAST.

(From our Own Correspondent.)

Messrs. Harland & Wolff have completed the fitting-out of the mail and passenger steamer *Orbita*, which has been built by them for the Royal Mail Steam Packet Company's South American service. The latest addition to this magnificent fleet left Belfast for Southampton on 8th June. She is [illegible] feet long by 65 feet beam with a gross tonnage of about 12,000 tons and is a triple-screw vessel having a combination of reciprocating engines and a low-pressure turbine. The scientific outfit includes wireless telegraphy and submarine signalling. The *Deseado*, one of the number of "meat" boats which they have in hand for the same owners, will be ready for sea in the course of a few days from writing. These boats also have extensive passenger accommodation. On 15th June there was launched from the south end of the Queen's Island a new twin-screw steamer named *Oxfordshire* for the Bibby Line. She has a length of 490 feet, with a beam of 55 feet, and is 8,600 gross tonnage. This vessel will also have wireless telegraphy and submarine signalling installed. The state-rooms are of the Bibby tandem type. Two sets of quadruple-expansion engines will be fitted, these being of the balanced type, by which means vibration is reduced to a minimum. Mr. E. Wilding, who gave such valuable evidence before the *Titanic* Enquiry Commission, has been appointed chief of the scientific department at the Queen's Island.

Messrs. Workman, Clark & Co.—This firm has a considerable volume of new tonnage fitting out, and several other vessels nearing the launching stage. They, like their neighbours, are fully booked up with orders for a long period ahead. The erection of the overhead crane system in their north yard is progressing rapidly. These cranes will prove of great advantage in the construction of vessels of big dimensions, of which they have orders for a number. Towards the end of May they completed and sent to sea the new screw steamer *Demodocus*, built and engined by them for Messrs. Alfred Holt & Co. She is a vessel of 6,640 gross tonnage, and the propelling machinery consists of a set of triple-expansion engines supplied with steam by two double-ended boilers working under forced draught. And on 15th June they had a successful trial trip of a sister-ship named *Laomedon*, built by them for the same owners.

New Railway Steamer.—The Belfast and County Down Railway Company's new steamer *Erin's Isle* was recently launched from Messrs. A. & J. Inglis's Pointhouse Shipyard. The vessel has been specially designed for the Company's summer passenger service between Belfast and Bangor, Co. Down. She is a paddle-steamer 225 feet long and 29 feet beam. The engines are of the compound type, and a speed of 16 knots has been guaranteed. It is expected that she will be on her station in a few weeks. The Company's other steamer, *Slieve Bearnagh*, which was built by Messrs. J. & G. Thompson in 1894, was recently disposed of to Dundee owners.

New Belfast - Ardrossan Steamer.— A new twin-screw steamer was recently launched at Fairfield for Messrs. G. & J. Burns' service between Belfast and Ardrossan, a route which is highly popular with travellers between the North of Ireland and Scotland. This is the first twin-screw steamer which Messrs. Burns have had built for them for their Cross-Channel service.

PUBLISHERS' ANNOUNCEMENT.—Our thirty - fourth annual volume is completed with the present number. The bound volumes, August, 1911, to July, 1912, comprising nearly 500 pages of highly interesting matter, will be ready shortly, and orders are now being taken for delivery of volumes at the following rates: 7/6 per vol., by post, securely packed, United Kingdom and Canada, 8/-; other countries 8/6. Binding cases may be obtained from the Publishers, price 1/6 each, carriage 3d. extra. A very complete index to volume 24 will be issued with the August number.

LAUNCHES AND TRIAL TRIPS.

LAUNCHES—English.

Eveston.—Messrs. Sir Raylton Dixon & Co., Ltd., recently launched the s.s. *Eveston*, an oil-driven cargo vessel fitted with a single-screw Diesel engine. The new vessel is designed as an ordinary cargo boat, and is intended to track between this country and America. She has a displacement of 4,400 tons, with a deadweight carrying capacity of about 3,100 tons on a light draught of water. Her speed is about 10 knots loaded. The vessel is complete with all auxiliary machinery, having six derricks, six winches, electric light throughout, steam-steering gear and windlass, worked by two large donkey boilers for rapidly handling cargo. The oil fuel will be carried in double bottom and in tanks. All the accommodation for officers and engineers will be fitted upon the bridge, and everything will be carried out on the most modern style. The whole of the engines have been constructed under the superintendence of Mr. C. H. Clayden, Mr. Ross, Captain Brackenbury, marine superintendent, and Mr. Houston, of Sunderland, representing the Diesel Company, and Mr. J. Fraser McDonald, the principal surveyor on the North-east coast for the British Corporation, for their highest class. It is interesting to note that the builders of this vessel have just completed a sister ship, fitted with ordinary reciprocating marine engines and boilers, which is running in the same trade for which the Diesel ship under review is intended. From the working of these two vessels it is anticipated that most reliable data will be obtained to make the comparison between the two systems of propulsion. It is expected that the oil engines in ordinary working condition will run about 4 tons of oil a day as compared with about 15 tons of coal being consumed in the steamer now running. The s.s. *Eveston*, which has a tonnage of 3,150, is to be fitted with a 1,000 h.p. Carels-Westgarth two-stroke Diesel marine engine, which is being built by Messrs. Richardsons, Westgarth & Co., Ltd. The engines have special features not to be found in other types of Diesel marine engines. Up to the present all such engines have been of the enclosed type, which has the disadvantage that they cannot be felt to ascertain the temperature of the crank pin and top end bearings. The Carels-Westgarth engines, however, are of the open cross-head type, and are so arranged that all the bearings can be felt whilst still running, and any over-heating can thus be detected immediately. In fact, in appearance they very closely resemble the ordinary set of steam engines, with the exception of the cylinders and valve gear. There are four cylinders 20 in. in diameter by 36 in. stroke arranged to run at 115 revolutions per minute. The scavenging air-pumps and the water-pump for cooling the cylinders and pistons are placed at the back of the engines and are driven by levers from the piston-rod crossheads, just as the pumps of a steam engine are arranged. The high pressure air compressor is placed at the fore end and is driven by a pin on the end of the crank shaft. All the auxiliaries required for operating the engines are driven by the engines themselves, so that it will not be necessary to run any other machinery when the engines are at work at sea. Messrs. Cochran & Co., Annan, Ltd., have supplied two Cochran donkey boilers, each fitted with patent seamless furnace.

Dimboola.—On May 3rd, the *Dimboola* was launched from the Neptune Works of Messrs. Swan, Hunter & Wigham Richardson, Ltd. The vessel is being built to the order of the Melbourne Steamship Co., Ltd., of Melbourne, Australia, being intended for their passenger and cargo service on the south-east, south and west coasts of Australia. She will run between Sydney, New South Wales and Geraldton, West

Australia, calling at various intermediate ports. She is expected to take about four weeks on the journey. The *Dromedary* is a twin screw steel steamer 400 ft. in length by 50 ft. beam by 34 ft. deep, with forecastle and poop and large cargo hold. She is fitted with a double bottom all fore and aft, and the safety of the passengers will be still further ensured by an installation of wireless telegraphy. The propelling machinery will consist of a set of quadruple-expansion engines, added with the boilers, are being constructed at the Neptune Works on the Vickers-Schlick-Tweedy system, thus ensuring an absence of vibration. There is an promenade deck amidships with a lounge containing the first-class music-room and state-rooms for twelve first-class passengers. Below this, on the bridge deck amidships, is the first-class dining saloon, a handsome room which will have sitting accommodation for about sixty passengers. On the same deck near at hand are state-rooms for sixty first-class passengers. Close to these is a very comfortable smoking-room for first-class passengers. On the same deck, aft, the second-class passengers have their dining saloon and a smoke room, whilst below are state-rooms for a very large number of second-class passengers. The carriage of cattle being an important feature in the trade, pens are arranged on the upper deck to carry about 200 head of cattle, whilst there are rooms for stockmen in attendance. The cargo arrangements are very complete and the gear includes four steam cranes, three steam winches, a derrick for lifting specially heavy loads, etc. As the vessel will frequently be trading in very hot climates, special attention is paid to the ventilation of all spaces, and there are a refrigerating engine and insulated rooms. Messrs. Thompson, Eyres & Bryers, of Sunderland, have superintended the building of the vessel.

Yarrowdale.—On May 3rd, Messrs. William Dobson & Co. launched from their shipbuilding works at Walker a steel screw steamer which they have built to the order of the Mackill Steamship Co., Ltd., of Glasgow. The vessel has been built to the highest class at Lloyd's with two complete steel decks, also poop, bridge and forecastle, and is of the following dimensions:—Length between perpendiculars, 390 ft.; breadth, 52 ft.; depth to upper deck, 29 ft. The propelling machinery, which is being constructed by the Wallsend Slipway and Engineering Co., Ltd., is of the triple-expansion type, having cylinders 25 in., 42 in., 68 in. diam. by 48 in. stroke. There are two large main boilers with Howden's forced draught arrangements and one auxiliary boiler. Messrs. Wailes, Dove & Co.'s "Bitumastic" enamel has been applied to the engine and boiler-room tanks, bunkers, peaks, etc., and their patent "Bitumastic" covering to the tank tops.

Nefeli.—On May 15th, Messrs. Wm. Doxford & Sons, Ltd., Sunderland, launched from their yard at Pallion the s.s. *Nefeli*, built to the order of Messrs. A. A. Embiricos & Co., London. The dimensions of the vessel are:—Length, 382 ft.; breadth, 52 ft. 2 in.; moulded depth, 25 ft.; deadweight capacity, 7,[illegible] tons. During construction the vessel has been superintended by Mr. A. Kairis. The classification is with the British Corporation, and Messrs. Doxford are supplying the engines and boilers.

New Londoner.—On May 16th, Messrs. Irvine's Shipbuilding and Dry Dock Co., Ltd., launched from their Hartlepool Dock yard the handsome steel screw passenger and cargo steamer *New Londoner*, built for Messrs. The London Steam Shipping Co., Ltd., Newcastle-on-Tyne. The vessel is essentially modelled, and is designed for an intermediate passenger service for their various trades. Her dimensions are as follows:—Length, [illegible] ft. by [illegible] ft. 6 in. depth moulded, having a long full poop and forecastle, with a little [illegible] ft. long over the poop; the poop, bridge and forecastle decks are sheathed with wood, and a steel lower deck is fitted in No. 2 hold. The vessel is built to the highest class under the British Corporation classification, having cellular double bottom for water ballast all fore and aft, also in fore and after peaks. She is provided with an equipment by the Admiralty Hydrographer. Accommodation for the [illegible] passengers is arranged in the poop, and comprises large and well-ventilated and lighted state-rooms having [illegible] berths, lavatories, etc., large dining saloon, pantry, [illegible], etc. Accommodation for a limited number of second-class passengers is given in the after-end of the poop. The officers' [illegible] accommodation is situated in the bridge and is replete with all the latest improvements, with a smoke room, pantry, etc. Approximately [illegible] room, about [illegible] ft. in length, with [illegible] on the bridge deck, giving every [illegible] to the passengers and crew, [illegible] working [illegible]. At the fore end is a large cargo hold and a [illegible] for the captain, chart and wheelhouse, with a flying bridge [illegible]. The [illegible] are fitted under the forecastle, where are also [illegible], etc. Particular attention has been paid to the appliances for loading and discharging the vessel, there being [illegible] derrick being fitted at No. 1 hatch. A complete installation of electric light is fitted throughout, including signal lamps, binnacles and [illegible] lamps, as well as a complete outfit of oil lamps as a stand by. Steam towing gear on the Wilson & Furniss principle is placed in a house aft and coupled up direct to the rudder stock, with power [illegible] and a quick warping [illegible] for hoisting the anchors. The engines, which are of the triple-expansion type, will be fitted by Messrs. Richardsons, Westgarth & Co., Ltd., Hartlepool, the cylinders being [illegible] in., 37 in. and [illegible] in. diameter by [illegible] in. stroke, and steam will be supplied by two large [illegible] boilers working under forced draught at a pressure of 180 lbs. per square inch. The design of machinery embodies the engine builder's latest practice, the main condenser being of the "Contrado" type, with temperature regulator. The feed pumps are of the [illegible] and work in connection with a cascade filter tank and surface feed heater. Extra large ballast and auxiliary duplex feed pumps are provided, and other accessories in the engine-room include Aspinall's governor and mechanical lubricators of the "Octopus" type. The machinery has been constructed to the specification of Mr. D. Pollard, Newcastle, under whose supervision the contract has been carried out. Messrs. Wailes, Dove and Co.'s "Bitumastic" enamel has been applied to the bunkers, engine and boiler-room tanks, bilges, peaks, open bottom, etc.

Germano, Emmanuel and Silver Line.—On May [illegible] there was launched from the yard of Messrs. Cochrane & Sons, Selby, the steel screw [illegible] the principal dimensions being [illegible] ft. by [illegible] ft. by [illegible] in. moulded. The vessel will be fitted with compound surface condensing engines by Messrs. Crabtree & Co., Ltd., of Great Yarmouth, and will be replete with all the latest improvements for the [illegible]. She has been built to the order of Mr. Emanuel Vagenas, of Syros, of Lisbon. On May 15th there was also launched from the same yard the steel screw steamer [illegible], the principal dimensions being [illegible] ft. by [illegible] ft. by [illegible] ft. [illegible], and has been built to the order of Messrs. Sociedade Portuguesa de Navegacao a Vapor, Oporto. She has been fitted with triple-expansion engines by Messrs. [illegible] Engineering Co., of Hull, and will be [illegible] the latest improvements for the time being of steam. A duplicate vessel also to the same order, the dimensions being [illegible] ft. by [illegible] ft. by [illegible] ft. [illegible] with compound surface condensing engines by Messrs. Crabtree & Co., Ltd., of Great Yarmouth. The vessel was christened [illegible].

Comanchee. On May 16th there was launched at Wallsend-on-Tyne the coasting oil petroleum carrier [illegible] for Messrs. [illegible]. The vessel was built to the order of Messrs. [illegible] and is intended for the Anglo American Oil Co., Ltd., of London. Her dimensions are [illegible] length, [illegible] breadth [illegible] ft. [illegible] in., and depth moulded, [illegible] ft. [illegible] in. The vessel is of the highest class in Lloyd's and Bureau Veritas. The engines and auxiliary machinery are constructed by the North Eastern Marine Engineering Co., Ltd., of Wallsend-on-Tyne. [illegible] Engine, [illegible] and [illegible] engines and [illegible] according to the [illegible].

Lynton Grange. On May 17th the Northumberland Shipbuilding Co., Ltd., launched from their yard at Howdon-on-Tyne the steel screw steamer *Lynton Grange*, which has been built to the order of Messrs. [illegible], Wilson & Co., Ltd.,

West Hartlepool, for the Houlder Line. The vessel is 390 ft. long by 49 ft. beam by 29 ft. deep, and has been built under special survey to the highest class at Lloyd's. She is fitted with long bridge, long poop, topgallant forecastle, the accommodation, which is very ample, being placed in steel houses on the bridge deck. The 'tween decks are lofty and so arranged that cattle, troops or emigrants may be carried if necessary. Special attention has been given to the loading and discharging gear and a complete outfit for the rapid handling of cargoes arranged for, consisting of nine steam winches by Messrs. Clarke, Chapman & Co., Ltd., Gateshead-on-Tyne, a large number of cargo derricks and steam windlass by Messrs. Emerson, Walker & Thompson, Bros. She is fitted with the usual water ballast arrangements for light passages. The machinery will be supplied by Messrs. Richardsons, Westgarth & Co., Ltd., Sunderland, consisting of engines with cylinders 25 in., 41 in., 69 in. by 48 in. stroke, three large boilers with 180 lbs. pressure. The vessel will carry about 7,500 tons on a light draught and steam about 10 knots loaded at sea.

Penolver.—On May 18th, Messrs. William Gray & Co., Ltd., launched the handsome steel screw steamer *Penolver*, which they have built for Richard B. Chellew, Esq., of Truro. She will take the highest class in Lloyd's Register and is of the following dimensions, *viz.* :—Length overall, 361 ft. 6 in. ; breadth, 50 ft., and depth, 25 ft. 11 in., with long bridge, poop and topgallant forecastle. The saloon, state rooms, captain's, officers' and engineers' rooms, etc., will be fitted up in houses on the bridge deck and the crew's berths in the forecastle. The hull is built with deep frames, cellular double bottom and large aft and fore peak ballast tanks, seven steam winches, steam steering gear amidships, hand screw gear aft, patent direct steam windlass, large horizontal multitubular donkey boiler, steel grain divisions, stockless anchors, telescopic masts with fore and aft rig, boats on deck overhead and all requirements for a first-class cargo steamer and Admiralty transport work. Triple-expansion engines are being supplied by the Central Marine Engine Works of the builders, having cylinders 25 in., 40½ in., and 67 in. dia., with a piston stroke of 45 in., and two large steel boilers for a working pressure of 180 lbs. per square inch.

San Dunstano.—On May 21st, the steamer *San Dunstano* was launched from the Neptune Shipyard of Messrs. Swan, Hunter & Wigham Richardson, Ltd. The steamer is being constructed for the Eagle Oil Transport Co., Ltd., of London, and is intended for the Mexican oil trade. She is specially built to carry oil in bulk, having ten oil holds and two pump rooms. For dealing conveniently with the heaviest oil, steam heating coils will be fitted in the cargo oil tanks. The vessel is 420 ft. in length by 54¼ ft. beam, and will carry 9,000 tons deadweight on a comparatively light draught of water. She is being constructed to attain the highest class in Lloyd's Register. The triple-expansion engines, placed aft, and the three main boilers which feed them, are also being constructed at the Neptune Works of Messrs. Swan, Hunter & Wigham Richardson, and are designed to propel the vessel at a speed of 11 knots per hour. Messrs. Wailes, Dove & Co.'s "Bitumastic" enamel has been applied to the bunkers, ballast tanks, etc., and their patent "Bitumastic" covering to the tank tops in boiler-room.

Torcello.—On May 22nd, there was launched from the yard of Messrs. Earle's Shipbuilding and Engineering Co., Ltd., of Hull, a finely-modelled steel screw steamer. The vessel, which is named the *Torcello*, is built to the order of Messrs. Thomas Wilson, Sons & Co., Ltd., and is intended for the Mediterranean and Baltic trades. The length of the vessel is 300 ft., breadth moulded 44 ft. 6 in., depth moulded 20 ft. She has been constructed of steel throughout to the British Corporation highest class and to the latest Board of Trade requirements. The vessel is of the shelter-deck type, with saloon deckhouse amidships, in which are situated the officers' rooms, the engineers being berthed in side houses abreast the engine casing. She has two steel pole masts, and very efficient appliances for the speedy handling of cargo, the derricks—ten in number—being capable of dealing with heavy lifts. The derricks will be worked by powerful steam winches of the most up-to-date description, and a latest improved steam windlass by Messrs. Emerson, Walker and Thompson is also fitted. The steering engine is placed in the deck house aft, and is controlled by the telemotor system from the navigating bridge, powerful hand screw gear is also combined with the steam steering engine, both of which have been supplied by Messrs. Amos & Smith, Hull. The work throughout the vessel is of the very best description, with all the latest improvements. Triple-expansion engines are provided by the builders, steam being supplied by two large steel boilers designed to drive the vessel at a good speed on a minimum coal consumption.

Hornfels. On May 30th, Messrs. Craig, Taylor & Co., Ltd., launched from their Thornaby Shipbuilding Yard, Stockton-on-Tees, a handsomely modelled screw steamer of the following dimensions :—374 ft. by 50 ft. by 31 ft. 4 in. moulded to bridge deck. She is built of steel to the highest class in Lloyd's Registry, and has long poop and topgallant forecastle ; large water ballast capacity in double bottom fore and aft and in peaks ; she is equipped with patent direct steam windlass with quick-warping ends, steam steering gear, eleven steam winches, double derricks and gaffs to each mast ; stockless anchors, large hatches, and all the latest improvements for rapid loading and discharging. The masts have been arranged to suit the Manchester Ship Canal requirements ; steel shifting boards are fitted throughout the holds and 'tween decks for the carriage of grain cargoes. The accommodation for captain, spare rooms, and officers is neatly fitted up in deckhouses amidships on bridge, the engineers being in deckhouses alongside engine casing, and the crew in the forecastle. Her engines have been constructed by the North-Eastern Marine Engineering Co., Ltd., Sunderland, the cylinders being 25 in., 41 in. and 68 in. by 45 in. stroke, with two large boilers working at 180 lbs. pressure, including Howden's forced draught, etc. The vessel has been built to the order of H. C. Horn, Esq., of Lubeck, under the superintendence of Captain Bartelt and Mr. B. Schmidt, assisted by Captain Ernst Thoms and Mr. A. Schomer, and is a duplicate of the s.s. *Luise Horn*, recently built by Messrs. Craig, Taylor & Co., Ltd., for the same owner.

Crios.—On May 30th, Messrs. Wm. Doxford & Sons, Ltd., launched from their yard at Pallion the steamship *Crios*, built to the order of Messrs. A. A. Embiricos & Co., London. The dimensions of the vessel are :—Length, 396 ft. ; breadth, 52 ft. ; moulded depth, 25 ft. Deadweight capacity, 7,400 tons. The classification is with the British Corporation and Messrs. Doxford are supplying the engines and boilers. During construction the vessel has been superintended by Mr. A. Kairis.

La Correntina.—On May 30th, a very interesting and important event in shipping circles took place at the Middleton Yard of Messrs. Irvine's Shipbuilding and Dry Dock Co., Ltd., West Hartlepool, when the second of the twin-screw insulated steamers built to the order of Messrs. the Houlder Line, Ltd., was successfully launched, this vessel being a duplicate of the twin-screw steamer *El Paraguayo*, launched from the Middleton Yard last year. The vessel is intended to take her place in the new fortnightly express service of steamers between the River Plate and Liverpool. The *La Correntina* has an insulated capacity of over 405,000 cubic ft., and the whole of this space is fitted for the carriage of chilled or frozen meat. She has been constructed to the plans and specifications of Messrs. Wm. Esplen, Son & Swainston, Ltd., and has been designed in excess of the rules and regulations governing the highest class in Lloyd's Registry, and to secure the Board of Trade Certificate for the carriage of passengers and to satisfy all the requirements of the Spanish Laws in relation to the carriage of emigrants. The dimensions of the vessel are 460 ft. in length by 59 ft. beam by 38 ft. 1 in. depth moulded. A lengthy description of the sister vessel *El Paraguayo* will be found in December issue of this journal.

Nervion.—On May 30th, Messrs. Osbourne, Graham and Co. launched from their yard at Hylton the steel screw steamer *Nervion*, which they have specially constructed to the order of Messrs. Fearnley & Eger, of Christiania, being the fourth vessel they have built for this firm. The vessel is of special interest owing to the fact that she has been built on the Monitor patent system and makes a third existing vessel of this type. She is on the single deck principle, with short poop, and long bridge, with all accommodation on top. Rooms for the captain and officers are tastefully fitted out in hardwood and are of large size. The vessel carries 3,300 tons on a shallow draught and is equipped with the most modern deck appliances. A special feature of the vessel is that she

will be fitted with Sieurin's patent discharging gear. She has been constructed under special rules to Norske Veritas survey, and also fulfils the requirements of Sjofartskontaret Rules. Water ballast is in both peaks and throughout double bottom, this enabling steamer to take long passages light with the greatest safety. After the launch the vessel proceeded direct to the works of Messrs. George Clark, Ltd., who will supply the machinery, which will be capable of driving the vessel a speed of 9 knots loaded, and owing to the type of construction the low consumption of 11 tons is safely anticipated.

Twickenham.—On May 31st, Messrs. Ropner & Sons, Ltd., Stockton on Tees, launched from their shipbuilding yard a steel screw steamer of the following dimensions, *viz* :—Length, 343 ft., breadth, 52 ft., depth, 30 ft. 3 in. The vessel will be classed 100 A1 at Lloyd's, having main deck, poop, bridge and topgallant forecastle. Accommodation for captain, officers and engineers in houses on bridge deck, crew in forecastle and poop. The vessel has been built to the order of Messrs. Watts, Watts & Co., Ltd., London, under the supervision of Mr. W. V. Lang, of London. She will be fitted with double bottom for water ballast on the cellular principle, all fore and after, and in fore and after peaks, and fully equipped with an up-to-date outfit including quick-warping steam windlass, stockless anchors, steam steering gear amidships, and powerful screw gear aft, independent winch condenser, electric light, etc., etc. The appliances for loading and discharging cargoes expeditiously are very complete, and include eleven steam winches, double derricks to each hatch, steam being supplied by a large donkey boiler working at 120 lbs. pressure per square inch. The engines will be of the triple-expansion type by Messrs. Blair & Co., Ltd., Stockton-on-Tees, of about 2,200 i.h.p., having two steel boilers 15 ft. 6 in. by 11 ft. 6 in., 180 lbs. steam pressure.

Throstle.—On June 3rd, Messrs. Wm. Pickersgill & Sons, Ltd., launched from their shipbuilding yard at Southwick, Sunderland, a finely-modelled screw steamer built to the order of Messrs. the Ogmore Steamship (1899) Co., Ltd., of Cardiff. Her principal dimensions are :—Length, 299 ft. 6 in. ; breadth 43 ft., depth, 21 ft. 6 in., and she is built under special survey to take Lloyd's 100 A1 class. The vessel is built on the deep bulb angle-frame principle, and is fitted with cellular bottom, whilst a very large after peak is also arranged for water ballast. Accommodation for captain and officers is fitted in deckhouse on bridge deck, together with a tastefully finished saloon, whilst the engineers are also accommodated in deckhouses at the sides of casing on bridge, the crew being berthed in the forecastle. Four extra large hatches are arranged with five winches and derricks for lifting heavy weights. The pillars at side of hatches have been dispensed with, so as to leave large clear holds. The vessel is also fitted with steam windlass and steam steering gear, which is fitted in the engine casing with controlling shafting to wheel on bridge. She will be rigged as a fore and aft schooner with steel lower masts and wood topmasts. The machinery is being supplied by Messrs. Geo. Clark, Ltd., of Sunderland, and is of a triple-expansion type, having cylinders 22 in., 37 in., 61 in. by 39 in. stroke, steam for which will be supplied from two large steam boilers with a working pressure of 180 lbs. Messrs. Wailes, Dove & Co.'s "Bitumastic" enamel has been applied to the after peak tanks, galley floors and the donkey boiler recess.

Steinstad.—On June 14th, Messrs. Robert Thompson and Sons, Ltd., launched from their Southwick Yard a single-deck steamer, built to the order of Messrs. A. F. Klaveness & Co., of Lysaker, Norway, this being the fifth vessel they have built for this well-known firm. Her principal dimensions are :—Length, B.P., 270 ft., breadth, 44 ft. 6 in., and depth moulded, 22 ft. 3 in. She is built to take the highest class in Det Norske Veritas, and is constructed on the deep-frame principle with one deck, leaving the holds clear of all obstructions. The erections consist of bridge, 54 ft., forecastle, 32 ft., both available for cargo if required, and poop for the accommodation of petty officers and crew, with separate messrooms for seamen and firemen. Large and spacious deckhouses are arranged on top of the bridge deck for captain, officers and engineers, the saloon being tastefully fitted up in polished oak. There are four large hatchways with double derricks fitted to each, one hatch having a special derrick with gear capable of lifting 20 tons, and six powerful steam winches, with large multitubular donkey boiler of ample capacity for supplying steam to deck machinery, steam windlass and steam steering gear. The engines, by Messrs. the North-Eastern Marine Engineering Co., Ltd., Sunderland, have cylinders 21½ in., 36 in. and 62 in., with a stroke of 39 in., steam being supplied by large boilers working at a pressure of 180 lbs. per square inch.

Saba.—On June 15th, there was launched from the shipbuilding yard of Messrs. John Readhead & Sons, Ltd., West Docks, South Shields, a new screw steamer, built to the order of Messrs. Scruttton, Sons & Co., London, for their "Direct" Line. The vessel is of the following dimensions :—Length, 381 ft. by 54 ft. 4 in. by 28 ft. 2½ in., and has been built to Lloyd's highest class on the spar deck rule, with exceptionally high 'tween decks for the West Indian trade, the arrangements generally and the facilities for working cargo, etc., having been specially designed to meet the requirements of this particular trade, and special attention has also been paid to the ventilation throughout the ship. A double bottom is fitted for carrying oil for fuel or water ballast. The vessel is supplied with eleven steam winches, and with eighteen derricks worked from cross-trees and tables on the masts, and in addition a heavy derrick capable of lifting [illegible] tons. The engines, also constructed by Messrs. John Readhead and Sons, Ltd., are of the triple-expansion type, having cylinders 28 in., 46 in. and 75 in. with 48 in. stroke, supplied with steam from two large steel boilers fitted with Howden's forced draught, and working at a pressure of 180 lbs. per square inch.

Andrew Marvel and Lord Lister.—On June 17th, there were launched from the yard of Messrs. Cochrane & Sons, Selby, two steel steam trawlers, *Andrew Marvel* and *Lord Lister*, the principal dimensions being 133 ft. 4 in. by 23 ft. by 12 ft. 9 in. moulded. The vessels have been built to the order of Messrs. Pickering & Haldane's Steam Trawling Co., Ltd., Hull, and the Yorkshire Steam Fishing Co., Ltd., Hull, and will be replete with all the latest improvements for the fishing trade. They will be fitted with powerful triple-expansion engines by Messrs. C. D. Holmes & Co., Ltd., Hull.

LAUNCHES—Scotch.

Marquiero.—On May 18th, Messrs. Murdoch & Murray, Port Glasgow, launched a twin-screw cargo and passenger steamer named *Marquiero*, which they have built for service on the River Amazon. The vessel will be one of the largest employed on the river. Messrs. J. G. Kincaid & Co., Greenock will supply the machinery.

Iguape.—On May 18th, Messrs. Scott & Sons, Bowling, launched a screw steamer named *Iguape*, which they have built to the order of Messrs. Pile & Co., London, for the Brazilian coasting trade. The vessel has been built to the Bureau Veritas class, and is of the following dimensions :—Length, 190 ft., breadth, [illegible], and depth, [illegible] in. Triple-expansion engines will be supplied by Mr. W. V. V. Ledgerwood, Coatbridge.

Nankin.—On May 18th, Messrs. Caird & Co., Greenock, launched the twin-screw steamer *Nankin*, which they have built for the intermediate service of the Peninsular and Oriental Steam Navigation Co. The new vessel, which is classed 100 A1 at Lloyd's, has a gross tonnage of 17,[illegible] tons. Her principal dimensions are :—Length, [illegible], breadth, 52 ft., and depth, 34 ft. 6 in. The *Nankin* will be well equipped with first and second-class passenger accommodation. Extensive plant for the rapid loading and discharging of cargo has been provided. Messrs. Wailes, Dove and Co.'s "Bitumastic" enamel has been applied throughout the bunkers and the double bottom and [illegible] "Bitumastic" covering to the tank tops. Messrs. Matthew Keenan & Co., Ltd., have the contract to apply their non-conducting composition to all boilers and steam pipes.

Passenger Steamer.—On May 20th, the Grangemouth Dockyard Co., Grangemouth, launched a passenger and cargo steamer which they have built to the order of the N.S.W. Coast Steam Navigation Co., Sydney, N.S.W., through Messrs. Hendry, M'Callum & Co., Glasgow. The vessel is classed in the British Corporation Register for the Australian coast service. The dimensions are 250 ft. in length, [illegible] ft. in breadth, and [illegible] ft. in depth moulded to main deck. The vessel is fitted to accommodate [illegible] passengers, and contains arrangements for passenger traffic, and [illegible]

the comfort of passengers in a hot climate have been provided, including special ventilation, teak decks, roomy and airy cabins, and electric light. An installation of refrigerating machinery has been fitted with heavily insulated chamber for the carriage of a large quantity of butter. Twin compound engines, designed to give a high rate of speed, will be supplied by Messrs. David Rowan & Co., Glasgow. The construction of the vessel was superintended on behalf of the owners by Messrs. Hendry, M'Callum & Co. Messrs. Wanles, Dove & Co.'s "Bitumastic" enamel has been supplied to the peaks, bunkers and boiler space.

Wandila.—On May 25th, Messrs. William Beardmore and Co., Dalmuir, launched the second of three twin-screw steamers they have on hand for the Adelaide Steamship Co., of South Australia. These fine vessels have been specially designed for the company's fast passenger service round the coast of Australia. They have a large carrying capacity and a good speed at sea. Their general dimensions are 410 ft. in length between perpendiculars, 56 ft. 6 in. beam, and 37 ft. depth (moulded to the upper deck). They are of about 8,000 tons, and are capable of carrying 5,000 tons deadweight. The hull and machinery, which have been constructed under special survey to the British Corporation's highest class, will be completed in accordance with the Board of Trade regulations for passenger steamers, and will be equipped with the most modern appliances for the efficient working of the ship and the rapid handling of cargo. Superior accommodation is provided for about 250 first, 120 second, and sixty third-class passengers on the three principal decks. The first and second class music-room and lounges are on the promenade deck, and the state rooms for these two classes are on the upper deck, as are also the dining saloons. The third-class accommodation is on the upper and shelter decks. The propelling machinery consists of two sets of quadruple-expansion engines supplied with steam from six water-tube boilers of the Babcock & Wilcox type, capable of developing sufficient power for a speed of 15 knots on service.

Tury Assu. On May 28th, there was launched from the yard of Messrs. Napier & Miller, Ltd., Old Kilpatrick, the steel twin-screw steamer *Tury Assu*, built to the order of Messrs. Jas. Pollock, Sons & Co., Ltd., London, for the Brazilian coasting trade. The vessel's dimensions are :—Length, 200 ft. ; breadth, 32 ft. ; moulded depth, 11 ft. 3 in., with a gross tonnage of about 700 tons, built to Lloyd's rules for their highest class. The vessel is rigged as a two-masted schooner, has main, promenade and boat decks. Accommodation for first-class passengers is provided for in state rooms in promenade deck and on main deck aft with dining saloon, music-room and smoking-room. Electric light is fitted throughout. The vessel has steam windlass, steam steering gear and water ballast in fore and aft peak tanks. Machinery consists of triple-expansion engines and one large boiler, is being supplied by Messrs. Miller & Macfie, Ltd., Stanley Engine Works, Glasgow. During construction the vessel has been under the supervision of Mr. Thomas Murray. Messrs. Matthew Keenan & Co., Ltd., have the contract to apply their non-conducting composition to all boilers and steam pipes.

Anversville.—On May 30th, Messrs. Alex. Stephen & Sons, Ltd., Linthouse, launched a twin-screw passenger and cargo steamer which they have built to the order of the Compagnie Belge Maritime du Congo, of Antwerp. The dimensions of the vessel are :—Length, 440 ft. ; breadth, 56 ft. ; depth, 37 ft. ; and she has been constructed to the rules of both the British Corporation and Lloyd's Register. The vessel marks a considerable advance in size, speed and accommodation on the previous vessels built by Messrs. Stephen for the same owners, and the extensive accommodation for passengers has been arranged to suit the particular requirements of the West African trade, a large number of single-berth cabins being fitted in deckhouses, many having private bath-rooms, and all provided with special fittings. The public rooms for all classes are well and tastefully designed for the passengers' comfort under quickly changing climatic conditions, the large saloons being arranged convenient both to the passengers and to the pantries and galleys. Lifeboats for all persons on board are arranged outboard under the latest type of Welin's davits, and in addition surfboats are provided for use on the African coast. The vessel is designed to carry a considerable cargo which will be handled by steel derricks and powerful cargo gear of latest type, capable of working any weight up to 30 tons in one lift. The twin screw machinery and the boilers have also been constructed by the builders.

Winchester. There has been launched at Scotstoun the fast turbine yacht *Winchester*, which has been built to the order of Mr. P. W. Rouss, of New York. The vessel, which is of special design, is 205 ft. in length, and 18 ft. 6 in. in breadth. The propelling machinery will consist of Parsons turbines, driving two shafts, steam being supplied by two boilers, fired with oil fuel. The trials of the vessel will be watched with great interest, as the yacht has been designed with a view to attain a speed of 32 knots, and will be therefore one of the fastest pleasure yachts yet built.

Intombi.—Messrs. Wm. Hamilton & Co., Port Glasgow, recently launched the steamer *Intombi*, which they have built for Messrs. T. & J. Harrison, Liverpool. The vessel is intended for Messrs. Harrison's South African intermediate service, and she is of the following dimensions :—Length, 378 ft. ; breadth, 47 ft. ; and depth (moulded), 29 ft. 6 in. The *Intombi* is built on the Isherwood system to Lloyd's highest class and to the requirements of the Board of Trade for a passenger certificate, with poop, long bridge and topgallant forecastle. Accommodation is provided amidships for a limited number of passengers, in addition to captain, officers and engineers, while the crew are berthed forward. The vessel is fitted with electric light, including a powerful searchlight on the forecastle head. For the handling of cargo eight steam winches are provided, and twelve derricks for dealing with 8-ton lifts, and a heavy derrick for handling weights up to 30 tons. The machinery, which will be supplied by Messrs. Dunsmuir & Jackson, Govan, is designed to give a speed of about 13 knots. The *Intombi* has been constructed under the supervision of Mr. R. D. Richardson, superintendent-in-chief for the Harrison Line. Messrs. Matthew Keenan & Co., Ltd., have the contract to apply their non-conducting composition to all boilers and steam pipes.

Hera.—The Greenock and Grangemouth Dockyard Co. launched from their Greenock yard recently an oil-tank steamer named *Hera*, which they have built to the order of the Deutsche Amerikanische Petroleum Gesellschaft, Hamburg. The *Hera*, which is the first oil-tank steamer built on the Isherwood system on the Clyde, has a deadweight carrying capacity of about 7,000 tons on a light draught. The principal dimensions of the vessel are :—Length, 385 ft. ; breadth, 52 ft, ; depth, 29 ft. 6 in. The *Hera* has been designed to carry all kinds of fuel, from benzine down to the heaviest grades. She has forty-seven oil-tight compartments and eighteen summer tanks for carrying benzine or light grades oil, so as to ensure the full deadweight being carried at all times. These summer tanks will not be used when the vessel is carrying heavy grades oil. A full installation of pumping machinery, capable of discharging the vessel when fully loaded in twenty hours, has been fitted. The vessel is of the most modern type of oil-carrier, and the latest improvements are incorporated in her hull and machinery. A set of triple-expansion engines will be supplied by Messrs. Rankin & Blackmore, Greenock, and the vessel has also been fitted with a liquid fuel burning installation. During construction the *Hera* was superintended by Messrs. Flannery & Baggally, Ltd., London ; Captain Crocker, Glasgow ; and Mr. Eckmann, representing the owners.

Campbell.—Messrs. Wm. Simons & Co., Renfrew, launched recently the dredger *Campbell*, which they have built to the order of the Indian Government, for the improvement of the waterways in Burma. This vessel, which is of the Simons suction reclamation type, has been designed and constructed under the direction of Professor Biles, naval architect and consulting engineer to the India Office. The *Campbell*, which is a twin-screw, light-draught, cutter dredger, will work in conjunction with a floating pipe line and terminal pontoon, arranged for delivering dredged material over river or canal banks for land reclamation. The dredging pump is driven by an independent set of triple-expansion engines, and the suction pipe is carried on a frame fitted in a well at the forward end of the vessel. The lower end of the suction frame is fitted with a steel, spiral, rotary cutter, driven by cast-steel, machine-cut gearing from a set of horizontal compound engines placed on the deck. The gearing and cutter are of

strength sufficient to stall the engines when working at full power. Independent steam hoist gear is provided for controlling the suction frame, and very powerful manœuvring winches are placed at each end of the vessel. An operating house on the upper deck contains levers and telegraphs which enable one man to have complete control of the dredging operations. The vessel has twin screws, each driven by a set of triple-expansion engines, and steam is supplied by two cylindrical multitubular boilers, constructed to Lloyd's requirements for a working pressure of 160 lbs. The boilers are fitted with Howden's forced draught for burning Indian fuel. A repair shop, with electrically-driven machine tools, capable of carrying out minor repairs, is fitted on board.

Saint Hugo.—On June 15th, Messrs. Archd. McMillan and Son, Ltd., Dumbarton, launched the steamer *Saint Hugo*, which they have built to the order of Messrs. Rankin, Gilmour and Co., Liverpool. The vessel, which is the fifth Messrs. McMillan have built for this firm, is of the following dimensions:—Length between perpendiculars, 400 ft.; breadth, 52 ft., and depth, 30 ft. She is fitted with all the latest arrangements for working cargo, and the holds are divided longitudinally for grain cargoes by a steel bulkhead. Large water ballast capacity is provided in cellular double bottom, in both peaks, and in deep tank amidships. The accommodation for officers and crew is very complete, and electric light is fitted throughout. The machinery will be supplied by Messrs. David Rowan & Co., Glasgow, and both vessel and machinery have been built under the special survey of Lloyd's for their highest class. During construction the steamer has been under the supervision of Mr. Reid, Captain Pugh and Mr. Forrest, the owner's representatives.

LAUNCH—Irish.

Oxfordshire. On June 15th, Messrs. Harland & Wolff, Ltd., launched at Belfast the large steel twin-screw steamer *Oxfordshire*, built to the order of the Bibby Line, of Liverpool. The new vessel is about 490 ft. long by 55 ft. beam and 8,600 tons. She will have four masts, schooner rigged, and will be equipped with powerful steam windlass and winches, patent steering gear, etc. The *Oxfordshire* will have two sets of Messrs. Harland & Wolff's latest type quadruple-expansion engines arranged on the "balanced" principle. As in the other vessels of this line, the state rooms will be arranged on the Bibby "tandem" principle, all the rooms being lighted with sidelights from the outside, and the public rooms will be in keeping with the traditions of this well-known and popular line. The vessel will be provided with an installation for wireless telegraphy, also submarine signalling, and other latest improvements for ensuring the safety and comfort of the passengers. Mr. Arthur W. Bibby was present at the launch, also Mr. Ramsay, consulting engineer, and Mr. Richard Hall, the Company's engineer, under whose inspection the vessel is being built.

TRIAL TRIPS.

Black Head.—On May 11th, the steel screw steamer *Black Head* ran her official trial trip in Hartlepool Bay. The vessel has been built for the Ulster Steamship Co., Ltd. (Messrs. G. Heyn & Sons, Belfast, managers). The vessel, which has been built to the highest class in the British Corporation Register, and complies with the Board of Trade requirements for a first-class cargo steamer, is estimated to carry about 3,200 tons deadweight, and is of the following dimensions: Length, 279 ft.; breadth, 40 ft. 2 in.; depth, 20 ft. 6 in., about 2,000 tons gross register. The steamer has been specially arranged for the Baltic trade of the company, schooner rigged with two masts, forecastle, long bridge house and poop. Accommodation for the captain, officers and engineers and a few passengers is arranged in steel houses on top of the bridge deck, with chart house, flying bridge and wheelhouse above. The outfit for working cargo is very complete and includes double derricks throughout, six winches, steam windlass and special warping arrangements, also steam-steering gear, electric light and all modern arrangements. The machinery and boilers have been supplied and fitted by Messrs. Richardsons, Westgarth & Co., Ltd., Hartlepool—triple-expansion engines with two large single-ended boilers working at a pressure of 180 lbs. per square inch, with full specification of auxiliary plant fully up-to-date. The hull and machinery have been constructed under the supervision of Mr. Hugh Wisnom, M.I.N.A., the Company's superintendent, and the vessel is commanded by Captain William Hiff, late of s.s. *Fair Head*, who has had long experience of the Baltic service of the company. On the trial a speed of 11½ knots was obtained, the machinery and all [illegible] working exceedingly well. After the trial the vessel proceeded on her first voyage to Riga.

Marcelle.—Recently Messrs. Osbourne, Graham & Co. sent to sea for her official trial trip the steel screw steamer *Marcelle*, which is the fourth vessel they have recently constructed to the order of Fernand Bonet, Esq., of Cette. The vessel is a single decker 270 ft. by 40 ft. 6 in., built to carry 2,400 tons on a very shallow draught, and is of the self-trimming collier type. Arrangements are made for a large amount of water ballast. Rooms for the captain and officers are tastefully fitted out in hardwood and are of large size. The vessel is fitted with the most modern appliances for economical and quick working of cargo. She has been constructed to Lloyd's highest class and also complies with the requirements of the French Law. Engines and boilers have been supplied by the North Eastern Marine Engineering Co., Ltd., of Sunderland, and during the loaded trial a speed of 10 knots on a four-hours' run was easily attained. After the trial the vessel proceeded on her first voyage to St. Nazaire.

Fitzroy.—This vessel, which has recently been completed by Messrs. Napier & Miller, Ltd., of Glasgow, for Sydney clients of Messrs. James Pollock, Sons & Co., Ltd., 3, Lloyd's Avenue, London, ran her trial trip a few days ago with most satisfactory results, notwithstanding the adverse conditions pervading at that period, the speed obtained being 11¼ knots per hour, which was ¼ knot over the contract speed. The dimensions of the *Fitzroy* are—Length, 175 ft.; breadth, 30 ft., and when loaded with about 340 tons she will have a mean draught of 9 ft. This craft is of the raised quarter-deck type, and has been specially designed for negotiating the rough weather that she will meet with during her work on the Australian coasts. Accommodation is very spacious for the size of vessel, consisting roughly of eight passenger cabins amidships on the promenade deck, in addition to deck officers and stewards, followed by a smoke-room and social hall aft. The crew are berthed in the forecastle; captain's cabin is immediately under the wheelhouse. The *Fitzroy*'s principal duty will be the carrying of large bulks of timber, and for this purpose she has been fitted with an extra large hatch in a well deck forward, which will facilitate loading and discharging which is often done in open roadsteads. Electric light is fitted throughout the vessel from a separate engine and dynamo, and refrigerating plant is installed on the ammonia system for cooling a hold which has a capacity of upwards of 3,000 cubic ft. The *Fitzroy* has been built to Lloyd's 100 A1 class, together with Board of Trade passenger certificate, which will make the vessel one of the most up-to-date passenger and cargo craft on the Australian coastal service. Two steam winches are fitted, one on the promenade deck and the other at after end of top-gallant forecastle. Steam-steering gear is fitted in wheelhouse on promenade deck. The machinery consists of a set of triple-expansion direct surface-condensing engines driving a three-bladed propeller. The boiler is of the return tubular type, of large diameter, in accordance with Pollock's usual practice, and has a working pressure of 180 lbs. per square inch.

Katoa. On May 13th, the new West coast steamer *Katoa*, which has been specially constructed to the order of the Union Steamship Co., of New Zealand, Ltd., went to sea for her trial trip. The vessel, which has been built to the highest class at British Corporation, for [illegible] to carry 3,700 tons on a light draught. The vessel was in a half loaded condition, and the trial, which was of twelve hours' duration, resulted in the vessel [illegible] speed of 12 knots. After the trial the vessel proceeded to Middlesbrough to complete loading for New Zealand. For Launch, see May issue.

Freland. On May 15th, the steel screw steamer *Freland*, built by the Northumberland Shipbuilding Co., Ltd., Howdon-on-Tyne, to the order of Messrs. The Nourse Trading Co., Ltd., Fred Dangerfield, Ltd., Liverpool, managers, left the Tyne for her official trial trip. The trial trip passed in every way satisfactory, and a speed of 11½ knots was obtained. For Launch, see May issue.

Fishpool.—On May 18th, the s.s. *Fishpool*, built by Messrs. Ropner & Sons, Ltd., of Stockton-on-Tees, made her official trial trip in the Tees Bay. The vessel has been built under the superintendence of Mr. J. Nicholson of Messrs. R. Ropner and Co., West Hartlepool, and on trial she behaved in a thoroughly satisfactory manner. The owners were represented by Mr. J. Nicholson and the builders by Mr. J. R. Crathwaite. After some satisfactory trial runs, during which the vessel attained a speed of over 11 knots, she proceeded to Montreal. For Launch, see June issue.

Luise Horn.—On May 18th, the handsomely modelled steel screw steamer *Luise Horn*, built by Messrs. Craig, Taylor & Co., Ltd., Thornaby Shipbuilding Yard, Stockton-on-Tees, to the order of Mr. H. C. Horn, Schleswig, was taken to sea for her official trial trip. During the whole of the run everything worked with the greatest smoothness, and a speed of 1[illegible] knots was maintained. Mr. H. C. Horn and Mr. Franz Horn, who were both on board at the trial trip, expressed themselves as being very highly pleased with the ship and engines. Immediately after the trial trip the vessel left for the White Sea under command of Captain C. F. Hinz. For Launch, see May issue.

Exmoor.—On May 20th, the new screw steamer *Exmoor*, built by Messrs. John Readhead & Sons, Ltd., West Docks, South Shields, to the order of Messrs. Walter Runciman and Co., Newcastle-on-Tyne, was taken to sea on her official trip trip. The trial was in every way satisfactory to all concerned. After loading, the vessel proceeded to Ancona under the command of Captain Stonehouse. For Launch, see June issue.

Harden.—On May 21st, the steel screw steamer *Harden*, built by Messrs. Wm. Gray & Co., Ltd., for Messrs. Harrison, Tidswell & Co., London, was taken to sea for her trial trip. After the usual manœuvring for the testing of compasses, etc., a run along the coast was made to the Tyne and back, during which the performance of both ship and machinery was highly satisfactory and a speed of 10½ knots registered, under very unfavourable weather conditions. Mr. W. Crandell, who has superintended the building of the vessel and machinery, represented the owners. The vessel afterwards proceeded to London with her cargo of coal. For Launch, see June issue.

Demodocus.—On May 21st, the new screw steamer *Demodocus*, built and engined by Messrs. Workman, Clark & Co., Ltd., Belfast, for Messrs. Alfred Holt & Co., Liverpool, left Belfast Harbour for Carrick Roads, where, after adjustment of compasses, the machinery tests and speed trials were successfully carried out. The vessel subsequently left for Swansea to take in coal and part of her cargo, and to afterwards proceed to Birkenhead to complete loading cargo for the voyage to the Straits, China and Japan. For Launch, see May issue.

Benefactor.—On May 23rd, the large steel screw steamer *Benefactor*, of about 5,500 tons gross, built by Messrs. David and William Henderson & Co., Ltd., Partick, to the order of Messrs. Thos. & Jas. Harrison, Liverpool, underwent her trials on the Firth of Clyde. During the trials everything worked satisfactorily, and a mean speed of about 14 knots was easily attained. The owners were represented by their superintendents, Mr. R. D. Richardson, Captain Turner and Mr. T. Sheriff. Messrs. Matthew Keenan & Co., Ltd., have completed the contract for covering the boilers and steam pipes on board with their patent non-conducting composition. For Launch, see June issue.

Anglo-Californian.—On May 23rd, the s.s. *Anglo-Californian*, lately launched by Messrs. Short Brothers, Ltd., of Pallion, Sunderland, left the Tyne for her official trials. During the trial a speed of 12 knots was easily maintained. For Launch, see April issue.

Kirkoswald.—On May 29th, the new steamer *Kirkoswald*, which has been built by Messrs. Archd. McMillan & Son, Ltd., Dumbarton, ran trials on the Firth of Clyde. The vessel, which is constructed on the Isherwood system, is of the single-deck type, with complete shelter deck and a lower deck fitted in the forward hold. The machinery was supplied by Messrs. Rankin & Blackmore, Greenock. The trials proved satisfactory in every respect, a speed of about 12 knots being obtained, and the vessel proceeded on her voyage immediately thereafter.

Arabistan.—On May 29th, the large steel screw steamer *Arabistan*, built by Messrs. Wm. Gray & Co., Ltd., for Messrs. Frank C. Strick & Co., Ltd., of Swansea and London, was taken to sea for her trial trip. Amongst those on board to witness the trial were Mr. Archibald Walker, who has superintended the building of the vessel; Mr. R. Marshall, representing the Board of Trade, and Mr. James Innes on behalf of Lloyd's Registry. The performance of the vessel and machinery was highly satisfactory, an average speed of 14 knots being obtained. The vessel afterwards proceeded to Middlesbrough to load. For Launch, see May issue.

Trentwood.—On June 8th, the s.s. *Trentwood*, built by Messrs. W. Harkess & Son, Ltd., Middlesbrough, to the order of Messrs. the Meteor Steamship Co., Ltd. (R. A. Constantine and Donking), Middlesbrough, was taken for her official trial trip. A mean speed of 10½ knots was obtained. A large party was on board, the owners being represented by Mr. R. A. Constantine and Mr. Wm. Constantine, who superintended the vessel during construction. The owners expressed themselves highly satisfied with both ship and engines. On the conclusion of the trials the vessel proceeded to Lowestoft. For Launch, see June issue.

Novington.—On June 13th, this new steel screw steamer, built by Messrs. Richardson, Duck & Co., Ltd., to the order of the Southdown Steamship Co., Ltd. (Messrs. Bell, Symondson & Co., managers), of London, was taken to sea for her trial trip. Amongst those present attending the trial trip were Messrs. R. T. Rutherford and W. Henderson, both of Cardiff, representing the owners; Mr. John Carmichael, representing the shipbuilders, and Mr. J. Brown, representing the engine builders, Messrs. Blair & Co., Ltd. A series of speed trials was undertaken off the Tees Bay and a mean speed of 12 knots attained. The vessel was also put through a series of turning and other tests with entirely satisfactory results, both as regards ship and machinery. The *Novington* left Tees Bay about 5 p.m. for Penarth, to load for a South American port. For Launch, see June issue.

Karamu.—On June 14th, the s.s. *Karamu*, recently built by Messrs. Ramage & Ferguson, Ltd., Leith, for the Union Steamship Co., of New Zealand, Ltd., Dunedin, went on her official trial on the Firth of Forth. The engines worked faultlessly, a speed of 11¾ knots on the measured mile being obtained. The *Karamu* has sailed for New Zealand. For Launch, see June issue.

Yarrowdale.—On June 14th, the new steamer *Yarrowdale*, built by Messrs. William Dobson & Co., Walker, for the Mackill Steamship Co., Ltd., of Glasgow, went to sea for her trial trip, when a mean speed of 11¼ knots was obtained in fully-loaded condition. This vessel has a length between perpendiculars of 390 ft., breadth 52 ft., depth 29 ft., and carries over 7,700 tons deadweight. The machinery has been constructed by the Wallsend Slipway and Engineering Co., Ltd., and is of the triple-expansion type, having cylinders 25 in., 42 in., 68 in. by 48 in. stroke, and steam is generated by two large boilers fitted with Howden's system of forced draught. After the trial the vessel left on her first voyage to Port Said under the command of Captain William Byers, the commodore of the owners' fleet.

Laomedon.—On June 15th, the new steamer *Laomedon*, built by Messrs. Workman, Clark & Co., Ltd., Belfast, for Messrs. Alfred Holt & Co., Liverpool, left Belfast Harbour and proceeded down the Lough for adjustment of compasses, machinery trials and speed tests. These all passed off successfully, and the vessel left for Birkenhead to complete loading for her initial voyage to the Straits, China and Japan. For Launch, see June issue.

West Wales.—The steel screw cargo steamer *West Wales*, recently launched by the Blyth Shipbuilding and Dry Docks Co., Ltd., has now left the builders' yard at Blyth, and, after loading at Cardiff, will proceed to Bahia Blanca. During construction the *West Wales* has been under the supervision of T. F. Appleton, Esq. For Launch, see June issue.

Salonica.—The new steel screw steamer *Salonica*, built by Messrs. Wood, Skinner, & Co. Ltd., Bill Quay-on-Tyne, to the order of Mr. Otto Thoresen, Christiania, for the Mediterranean and Black Sea trades, has recently had her official trial trip off the Tyne. This vessel has been constructed to carry a deadweight of 4,750 tons on a light draught of water, and is of single-deck type with poop, extended bridge and topgallant forecastle, designed and fitted to comply with the Board of Trade requirements for carrying grain in bulk. The saloons and cabins are arranged in a large steel deck-house on the bridge deck. The vessel has five hatches, each worked

by double derricks of Mannesmann steel tubes, and fitted with eleven powerful steam winches, direct acting steam windlass, steam steering gear in engine room controlled from the flying bridge, and complete electric light installation throughout. The propelling machinery, which has been constructed and fitted at the Northumberland Engine Works of Messrs. the North-Eastern Marine Engineering Co., Ltd., Wallsend-on-Tyne and Sunderland, consists of a set of their latest type of triple-expansion engines, having cylinders 23 in., 37½ in., 61½ in. with a stroke of 39 in., steam being supplied by two large steel boilers working at a pressure of 180 lbs. per square inch, and fitted with Schmidt's patent superheater. The North-Eastern Marine Engineering Co., Ltd., now make a speciality of installing these superheaters to new or old vessels, this being the fourth vessel so fitted by them with most satisfactory results, whilst another three are being constructed. Not only is a saving of 10 to 15 per cent. shown in the coal consumption, but a corresponding increase in the cargo carrying capacity of the vessel is effected. The additional expense incurred in a new vessel is wiped out in one and a half to two years' service at sea; the value of the vessel is also enhanced by her small consumption of coal. Throughout the trial the machinery ran very satisfactorily, and a speed of 10½ knots was easily maintained.

Ranella. Messrs. Swan, Hunter & Wigham Richardson, Ltd., have recently successfully completed the trial runs of the oil tank steamship *Ranella*, which they have built for the Anglo-Saxon Petroleum Co., Ltd. The engines and boilers placed at the aft end of the ship have been built by the Wallsend Slipway and Engineering Co., Ltd. The trial runs were made with oil fuel. The contract speed of 11 knots was considerably exceeded, and everything worked to the satisfaction of all concerned. For Launch, see June issue.

Cordelia. An important addition to the fleets managed by Messrs. C. T. Bowring & Co., Ltd., has just been made in the large oil tank steamship *Cordelia*, which has run her loaded trial off the mouth of the Tyne. The machinery and boilers, which have been built by the Wallsend Slipway and Engineering Co., Ltd., worked without a hitch to the satisfaction of all concerned, the contract speed being exceeded. The *Cordelia* is owned by the Oil Tank Steamship Co., of Liverpool, a company under the management of Messrs. C. T. Bowring & Co., who were represented on the trial trip by Mr. T. B. Bowring, Mr. Fred Bowring and Mr. Henry A. Bowring. For Launch, see June issue.

Shwedagon.—The trial trip has taken place of the steel screw tank steamer *Shwedagon*, built at Walker-on-Tyne to the order of Messrs. Steel Brothers & Co., Ltd., of London, on behalf of the Indo-Burman Petroleum Co., Ltd., of Rangoon. The trial was carried out with oil fuel, and a mean speed of 10 knots was attained. The vessel returned to the Tyne for bunkers, and the boilers will be fitted with coal-burning gear for the voyage out to India. For Launch, see May issue.

NEW LONDON DOCK.

THE contract for the new London Dock, to the south of the Royal Albert Dock, has been offered to Messrs. S. Pearson & Son, Ltd. The contract will include the construction of the entrance lock, 800 ft. by 100 ft. by 45 ft. deep, a main dock 4,500 ft. long by 600 ft. wide and 35 ft. deep, with a water area of 65 acres, a dry dock, railway lines, sheds, and a passage connecting with the Royal Albert Dock. Excluding the working equipment of the dock the cost will be about £1,400,000. The contractors are to complete the work by 1916. The first sod will be cut by the King on July 17th.

THE GERMAN NAVAL ARCHITECTS.—The extra summer meetings of the Schiffbau-technische Gesellschaft commenced on the 4th of June and lasted five days.

MESSRS. COCHRAN & CO., ANNAN, LTD., inform us that the s.s. *Zelva* launched on the 15th June by Messrs. Brown and Co., Greenock, has been supplied with a Cochran (Annan) donkey boiler fitted with patent seamless furnace.

The Marine Engineer and Naval Architect Patent Record.

Compiled by Messrs. E. P. Alexander & Son, Chartered Patent Agents, 306, High Holborn, London, W.C.

2811. Hoisting Apparatus for Ships' Boats, etc. Comprising apparatus particularly applicable for raising and lowering ships' boats, and consists in journalling a hoisting-drum in brackets, which may be swing through a small angle so as to cause a friction collar on the drum to engage either driving mechanism or a brake. The drum 1 is loose on the shaft 3 carried by swinging brackets 4 fitted with a horizontal arm 8 operated by the rod 9 and handle 10. When

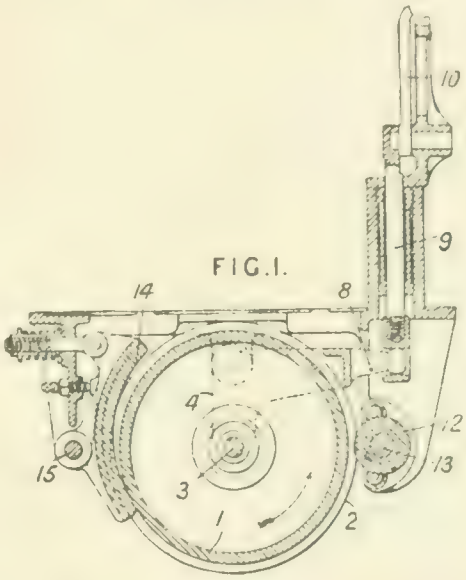


FIG. I.

the rod 9 is raised, it causes the friction collars 2 on the drum to engage corresponding collars 12 on the driving shaft 13, which may extend the length of the ship. Depression of the rod 9 causes the collars 2 to engage a spring brake block 14 which is pivoted at 15 in a line with the axis of the drum. A brake of this description may be applied to drums of other kinds, for instance, to drums the axles of which are mounted eccentrically.

3641. Turbines. Relates to a ship's turbine plant in which a high-pressure stage *b*, an intermediate stage *i*, and two low-pressure stages *l*, *k* are connected by pipes which

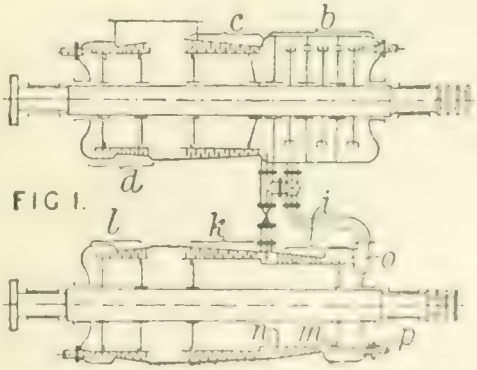
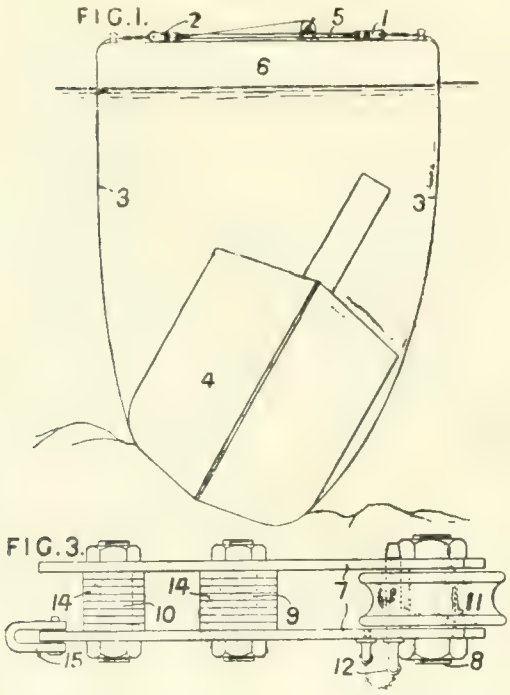


FIG. I.

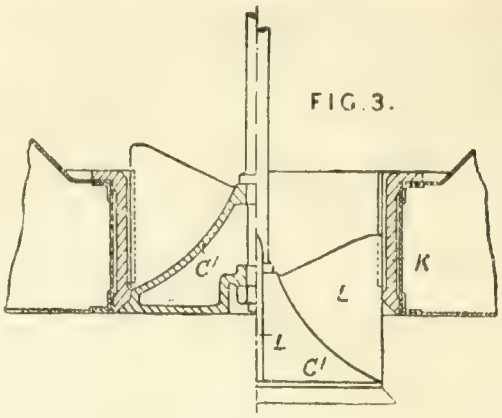
permit, for one load, the connection of the stages *b*, *c* in series as one unit and the stages *i*, *k* in series as a second unit, and, for a lesser load, the connection of the stages *b*, *i* in series exhausting into the stages *c*, *k* arranged in parallel, and in which the steam exhausted from the stage *b* in the latter arrangement is admitted to the intermediate stage *i* through nozzles *o*, and, in the former arrangement, the initial steam is admitted to the stage *i* through other nozzles *p*. The invention consists in the construction of the intermediate turbine with a stage having impulse blading *m* and a drum member carrying reaction blading *n*. Reversing turbines *i*, *l* are provided, and the turbine stages on each shaft may be grouped in one or several casings as desired.

3966. Pulley-tackle: Raising Sunken Ships. A lifting device comprises two blocks to which the ends of the lifting rope or the like are attached, and having sheaves over which a hauling-rope passes so as to draw the two blocks towards each other. In the example shown, the device is mounted on a barge 6 and is applied to the raising of sunken vessels. Each block comprises side cheeks 7 connected by pins. On the outer pin 8 is mounted a roller 11, which may be locked



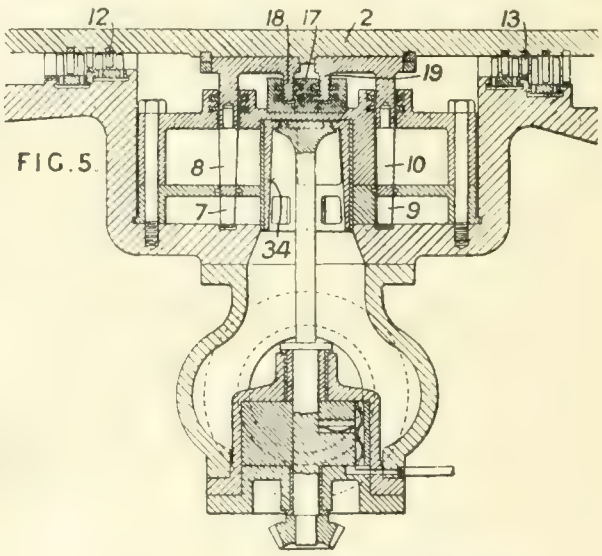
against rotation by pins 12 engaging any of a series of holes provided in the roller. The pins 9, 10 carry several sheaves 14. The lifting-rope 3 is looped round the end roller of the block 1, and is passed under the vessel 4 and looped round the outer roller of the block 2. One end of the hauling-rope 5 is fixed to one block by the shackle 15, and is passed over the sheaves 14 of each block, and then secured to the winch. On hauling, as soon as the strain is taken on the ropes 3, the rollers 11 are locked.

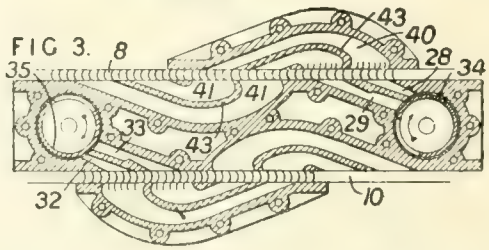
3666. Dredging Vessels, etc. In a hopper dredger or barge having discharge openings at the bottom, the valves controlling the openings are adapted to be lowered axially to allow the spoil to escape. In Fig. 3, the valve C1 is shown in section in the closed position on the left, and in elevation in the open position on the right. The valve seat is formed by the conical face of a liner K, and packing may be interposed between the valve and its seat. The valve C1 is provided with guiding-ribs L, rotation of the valve being prevented by snugs on the liner K. The upper portion of the valve is conical or conoidal, in order to assist the discharge



of the spoil. In a modification, the valve fits like a piston in the liner, packing being provided.

4403. Turbines. A reversible marine turbine has a rotor 2 carrying a row of double-deck impulse blades 7, 8, and a set of reaction blades 12 for ahead motion and a similar row of double-deck blades 9, 10, and a set of reaction blades 13 for astern motion. The blade-rings 7, 8, 9, 10 are each arranged for re-entrant or circular-flow working. Multiple-ported valves 34, 35, control the steam supply to the various nozzles for ahead and astern motion respectively. Fig. 3





shows the nozzles 28, 29 delivering upon the ring 8, and also the returning nozzles 40, 41 and their partitions 43. Similar nozzles 32, 33 deliver upon the astern ring 10. A similar arrangement is provided for the outer blade-rings 7, 9. The valves 34, 35 are arranged to open their nozzles in succession in any desired order. The steam exhausting from the circular-flow wheel is further expanded in the reaction blading 12, 13. The reversing section is separated from the ahead section by an arrangement of packing 17, 18, 19 of known form.

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